The Builder.

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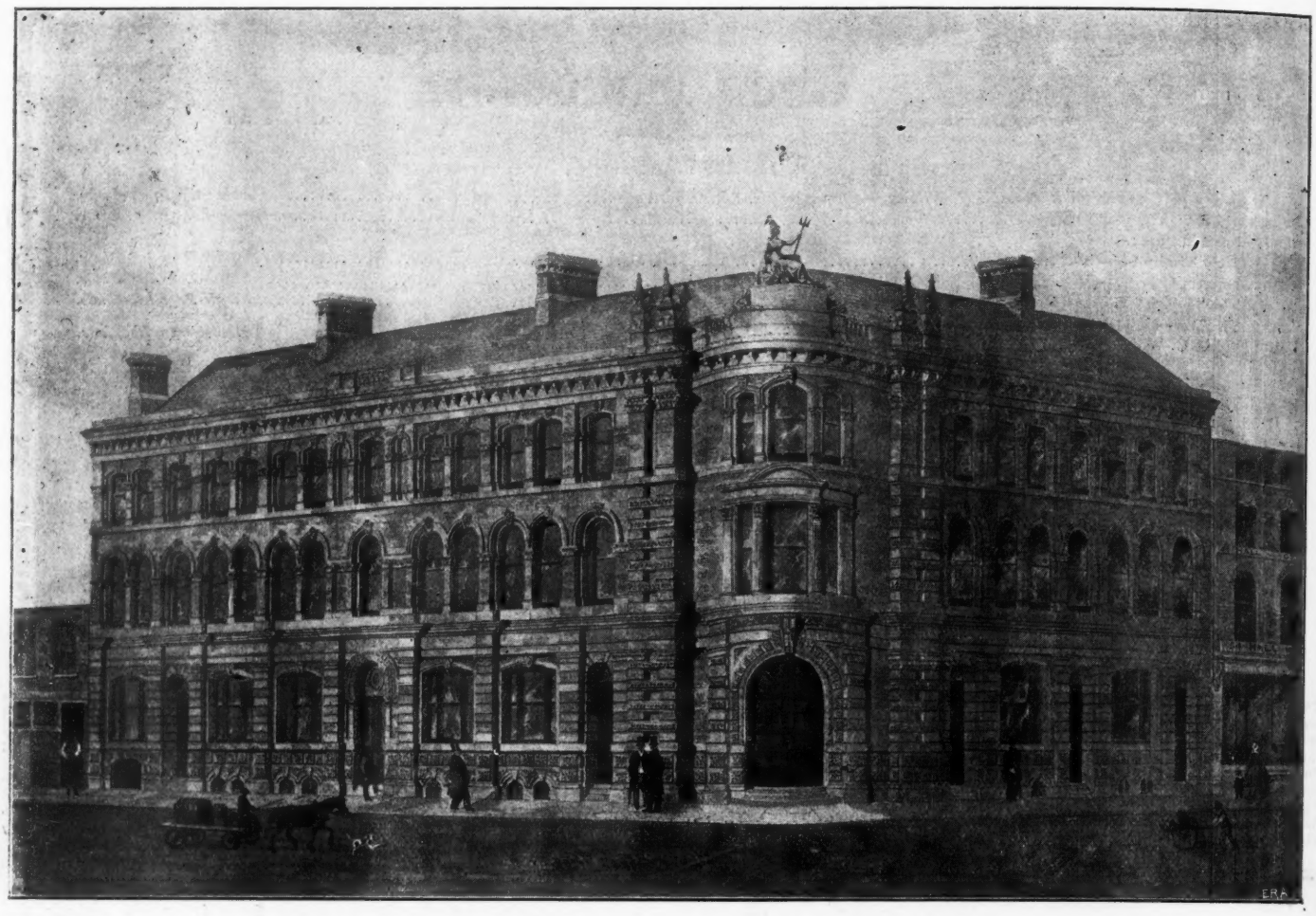
The Architecture of our Large Provincial Towns.

XIV.—HULL.

HULL, or Kingston-upon-Hull, as it has been officially designated from the time when Edward I. took the place under his special patronage, is a town with a long and distinguished history, yet singularly lacking in anything which appears to attract the ordinary traveller. Among the large towns of England it is literally unique in being situated on an absolutely flat and alluvial plain, only just raised above the high-water level of the great river-mouth or estuary called the Humber. One very happy consequence of its open, wind-swept situation is that for a town numbering upwards of 200,000 inhabitants, and containing a good many manufactories—oil and colour-mills especially predominating—it is singularly clean and free from smoke. There is absolutely no appearance of the smoky pall which perpetually hangs over several of our great inland cities, and the streets as a rule are as clean as those of an ordinary little market town of a few thousand souls. Without extending the parallel too far, it is no exaggeration to say that that particularly tidy, cheerful, well-to-do look always associated with the towns of Holland, is also to a very large extent characteristic of Hull; and in spite of an unquestionable monotony, there is really much that is pleasant and to a considerable degree interesting about the place.

The earlier importance of Hull as a seaport is to be traced to the convenient haven, for craft of former days, afforded by the narrow, but deep and slow-flowing river from which it takes its name. The commonly-repeated story that the town was founded *de novo* by Edward I. is not strictly true. There was undoubtedly a village already existing in the angle between the two rivers, referred to in twelfth and thirteenth century documents as Wyke, Wyke-upon-Hull, and sometimes Hull only, as at present. This was the property of the monks of Meaux Abbey, from whom Edward acquired it by exchange in 1293, and immediately gave it the new title of Kingston-upon-Hull, making it a royal manor, under the administration of a warden and bailiffs, responsible only to himself. His object in this was to secure the absolute control of the port, both for military purposes and on account of the commerce which he rightly conceived might be developed there. But we cannot quite agree with the statement in Turner and Parker's "Domestic Architecture" (vol. ii., chap. v.) that Hull belongs to the class of towns specially designed and built by Edward I., like New Winchelsea and the *bastides* of Guienne. The Old Town, the original Hull, can never have shown the rectangular setting-out characteristic of those towns, and was not fortified until late in the reign of Edward II., and then by the inhabitants themselves, under an ordinary "license to crenellate." The line of these fortifications, which remained the boundary of the town until about a century ago (enduring two sieges in the Great Civil War, when, as at Leyden, the whole of the surrounding country was laid under water by the defenders), forms a prominent feature of the present town; the three oldest docks having been made by successively deepening and enlarging the original ditch, which stretched in a nearly semicircular curve from river to river, so that the Old Town is actually an island. In this island, now entirely a business quarter, and reminding one of the City in the daily exodus from it at six o'clock, the only remains of mediæval Hull must be sought. They are not many: one large church, one small one, and a few neglected and perishing remnants of inns and private dwellings, practically form the list. The street-names throughout this district, however, greatly assist in picturing the former aspect of the town; it is comparatively easy to trace the gradual westward growth and filling up of vacant spaces, starting from the original Hull-street, afterwards called High-street, at first a single line of houses following the bank of the river, which for centuries remained the abode of the merchants, with their homes close to their wharves, while the more open region towards the landward walls was chosen for the foundation of churches, monasteries, and the buildings of the guilds. The Church of the Holy Trinity (see lithograph), which from its foundation (some time in the thirteenth century, and pretty certainly anterior to the reputed "foundation of Hull" by Edward I.) has always been the principal church in the town, is a large and dignified but not otherwise remarkable structure. It cannot, as some guide-books claim for it, be actually considered the largest parish church in England in spite of the recent elevation of some of the larger ones to cathedral rank, those of Yarmouth, Coventry, and Boston exceed it in area; but it is unusually lofty, both in nave and chancel, for a church of that class, and may fairly be called one of the most imposing in the country, in spite of some obvious weaknesses in its design. The actual history of the church is obscure, and this is hardly the occasion to attempt to unravel the archæological puzzles connected with it, though one interesting fact is certain, that we may see in the walling of the chancel and transepts, built in all probability in the first half of the fourteenth century and of local materials, some of the earliest mediæval



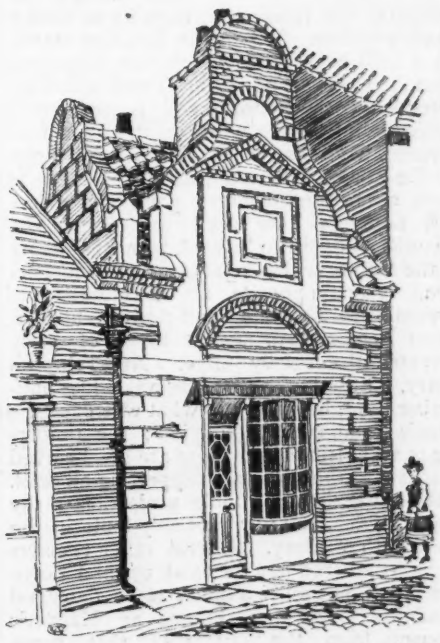
Exchange Buildings. (*Mr. W. Botterill.*)

brickwork in England; the great flowing tracery windows of these parts of the church are well known, and have been often illustrated. Of the much smaller Old Town church, St. Mary's, the true history is also beset with uncertainty; what we see at present is clearly only a portion of the original building, and the most striking feature, the tower (see lithograph), which in its outline is suggestive of the tower of Magdalen College, Oxford, is an entirely modern work, designed by Sir Gilbert Scott.

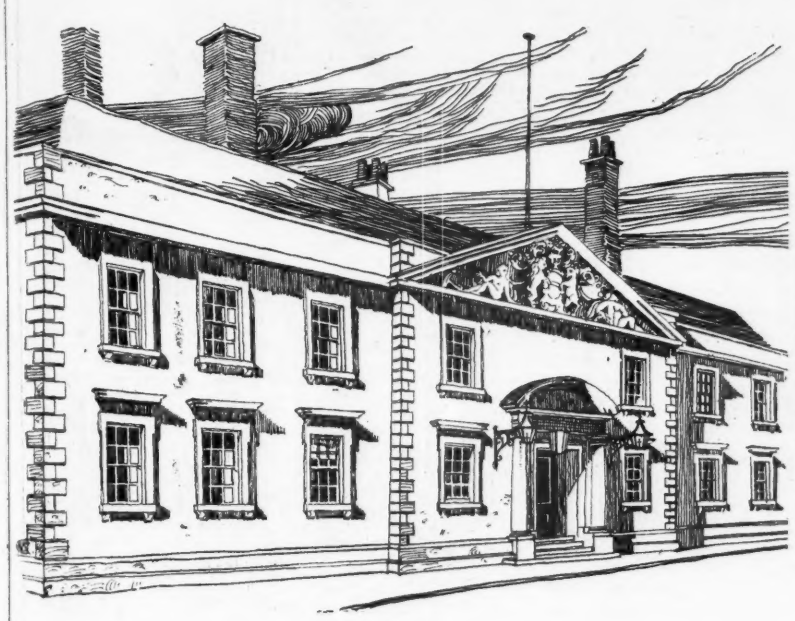
As the most convenient starting-point for a general survey of the town we may take the Victoria Pier, the landing-place of the ferry-boats bringing passengers across the Humber, from Lincolnshire. This pier comes about midway in the line of docks which stretch along the banks of the river for about four miles, and is within a short distance of the confluence of the Hull and Humber, the probable site of the earliest beginnings of the town. The row of houses facing the broad quay is called Nelson-street, and presents nothing remarkable amongst the offices and hotels of which it is composed; though, turning up into Queen-street, the Pilot Office, at the corner on the left, with its look-out place on the roof, reminds one of the chief occupation of the place, with a feeling of regret that a building so suggestive in its character, should yet have about it so little of the picturesque. In Queen-street the first prominent building is the Corporation Market Hall, opened in 1887, the plans for which were begun in the Borough Engineer's Office, but the work carried out by Mr. W. A. Gelder. The street fronts offer plenty of variety, both of composition and materials, and the Corporation, who are said to have spent 20,000*l.* upon the building, may be credited with the desire of producing an interesting piece of street architecture; the general effect, however, somehow fails of being pleasing, chiefly from a coarseness and want of proportion pervading the details, which renders the description "designed in the Flemish Renaissance style," distinctly inappropriate; nothing of like character was ever erected in Flanders, and it gives rather the impression of a *pot-pourri* of modern English work of the few years preceding its erection. Continuing along the Market-place, a fairly wide street, but not a *place*, or open space, in the ordinary sense, the site of the old market-cross, at the junction with Mytongate, is marked by a conspicuous equestrian statue of William III., by Scheemaker; the king appears in the guise of a Roman general, and both man and horse are brightly gilt from head to foot. Just beyond this the high east end of the church of the Holy Trinity rises sheer from the pavement, without any intervening churchyard; to enter, it would be necessary to turn down one of the narrow lanes, South or North Churchside; but the church having been already noticed, we now keep to the main street, soon coming to the Post Office, the work of Mr. Williams, and dating from 1877. This is of the usual official stamp, cold and commonplace modern Italian in design, and only too good and permanent in execution; Spinkwell stone, apparently, having been employed.

We now enter the region where the principal banks and commercial offices are congregated. At the corner of Lowgate (as the line of the Market-place here begins to be called, the other portion being anciently called Highgate), at its junction with Silver-street, the York City and County Banking Company have a large stone building with a corner entrance, designed by Mr. W. Botterill in 1870; the florid and rather coarse variety of Venetian Renaissance adopted is characteristic of the period of its erection, but it has, at all events, a thoroughly bank-like appearance. At the next corner, on the same side, the Royal Insurance Buildings, of much later date, by Messrs. Smith & Brodrick, show a more refined type of Renaissance, based upon French models; here all the string-courses and cornices are of small projection and delicately moulded, and the main cornice is altogether omitted wherever gables rise above the general eaves-line; the whole treatment is well adapted to a narrow street, and is aided in effect by the pleasant colour of its creamy stone, as yet undarkened, and red granite plinth; a rather pretty oriel is corbelled out over the main entrance, which, as in a great many instances in the neighbourhood, is placed at the canted angle. Almost opposite, another kind of contrast is provided in the large block occupied by the Yorkshire Fire and Life Insurance Company and by the Hull Club. This, also the work of Messrs. Smith & Brodrick, is a Gothic building, partly early French, partly Venetian in its inspiration, and carried out in stone and red brick. The detail is less coarse and better subordinated to the scale of the building than is usually found in imitations of those styles, and the general aspect, rich, without becoming too "busy," is decidedly satisfactory. The Exchange, at the corner of Bowlalley-lane, built in 1865, by Mr. Botterill, is a large pile of buildings of greater commercial than architectural importance. Besides the Exchange proper, a large hall not indicated in the design of the exterior, it contains numerous offices of public companies and private firms, a restaurant, &c.; it is built of grey stone and white brick, has two longish fronts, the angle being turned into a quadrant with a prominent corner entrance, and, in general appearance, is heavy, dull, and respectable. Coming in this direction along Lowgate, the tower at the west end of St. Mary's Church, added by Sir Gilbert Scott, forms a strikingly picturesque object, standing out, as it does, in an unusual manner, right over the footway, which is carried through the open arches of the lowest stage; its effectiveness is much increased by the greenery of the little churchyard opening out from the street just before the tower is reached, and forming, with the church on one side, the vicarage (a Gothic building by Sir Gilbert Scott, mainly of red brick) on another, and the club just mentioned on the third, a kind of quadrangle. Of the church itself we have already spoken. A

Wilberforce House, High-street.



Old House, Dagger-lane.



Trinity House.

Custom House.

little way beyond, and rather hidden by a bend in the street, is the Town Hall (see lithograph), by Mr. Brodrick, the architect of Leeds Town Hall; it is singularly badly situated for getting a general view of its exterior, as, although actually isolated and in plan rectangular, it has practically only one visible front, and that forms part of the general line of a comparatively narrow street, without even a cross street from which the building could be seen from a distance. In spite, however, of this drawback, the Town Hall is by no means unimpressive, while it looks its character thoroughly. It does not command even the smallest quarter of the town in the manner that some municipal buildings dominate an entire city, but when it is once seen, its function is unmistakable. Not only in the exterior, but inside also, the general massing and modelling are far superior to the treatment of parts considered separately; it gives the impression of being the work of a man with a talent for the higher branches of design considerably above the average, but trained in a bad school, so that a really meritorious conception has been somewhat injured by the commonplace quality of its details. Colour has entered to some extent into the design; outside, the Portland stone hue of the general walling is relieved by ranges of red Mansfield pilasters and columns (unfortunately badly weathered and bleached to a pale, weak tint); while inside, besides the use of coloured stones and marbles, a very complete and on the whole satisfactory scheme of painted decoration has been carried out, embracing the entrance hall, the grand staircase, and all the principal rooms. These decorations were designed in the first instance by Mr. Lewis F. Day, nearly twenty years ago; some of his original work remains, and is, as might be expected, both interesting and appropriate; much of it, however, has lately been repainted, and although some effort has been made to follow the character of the older work, the general harmony has been somewhat marred. The marble statues of Edward I. and of eminent citizens of the town, by various sculptors, which adorn the hall and staircase, deserve mention, some being fairly successful works.

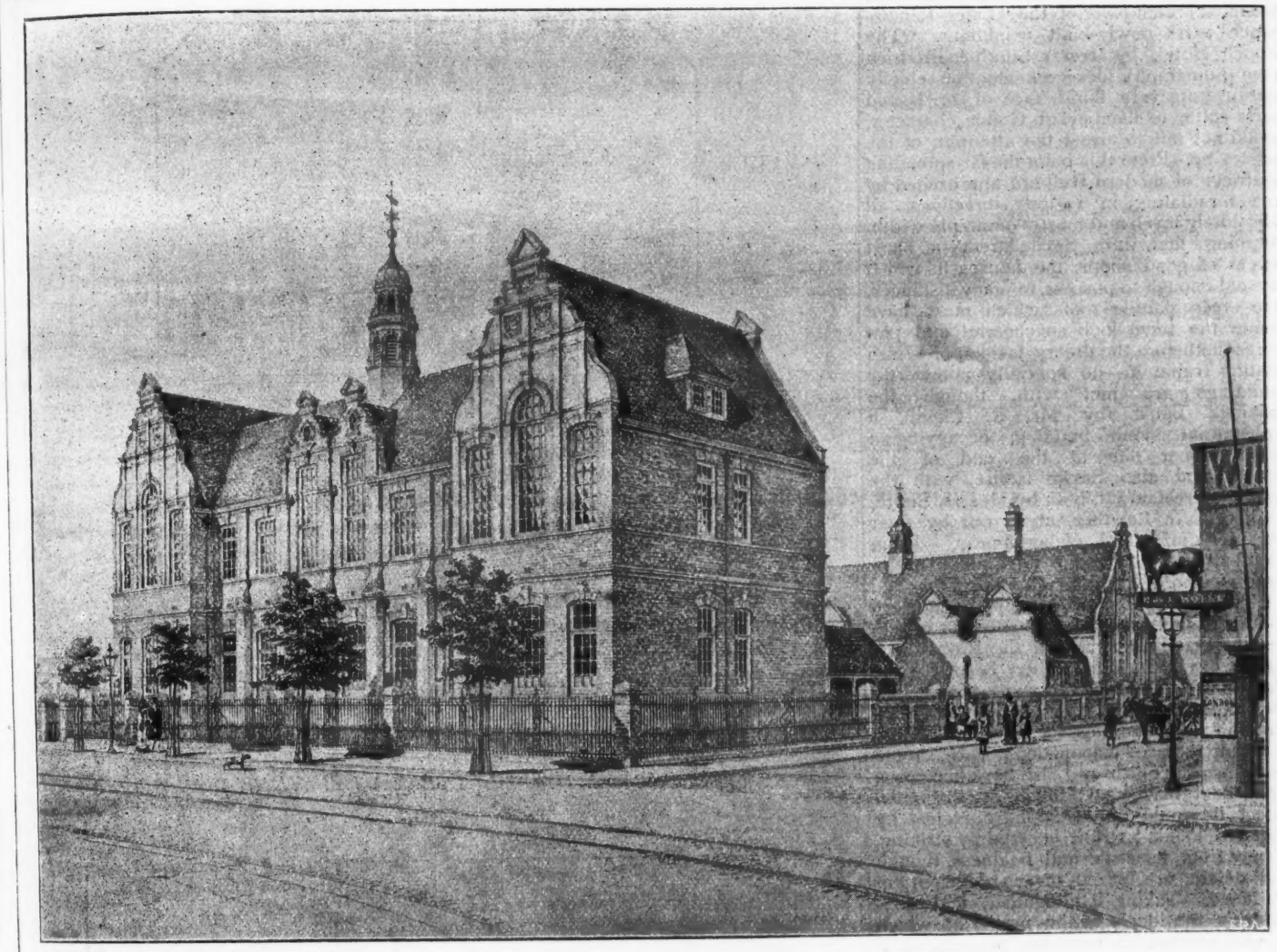
Rather behind the Town Hall, in Broadley-street, we may notice the Kingston Gas Office, by Messrs. Smith & Brodrick, an example of a favourite modern fashion of a profusion of low-relief plaster work, applied in this case to a front of mixed red brick and stone, producing a result decidedly florid; and then may turn through Salthouse-lane into High-street, which runs almost parallel with Low-gate and the Market-place, between them and the River Hull. Though still, from a business point of view, an important locality, this street, the history of which has been noticed in describing the growth of the town, looks very different from the ordinary High-street of a provincial town. It is, in fact, a narrow lane, only just wide enough for two carts to pass at a walking pace, with the pavement represented in many places by a mere curb, and bordered on one side chiefly by warehouses, and on the other by offices; from it run off smaller lanes called "staiths," almost as narrow as the Yarmouth "rows." High-street, however, still teems with associations recalling the early history of the port, and the lives of the merchant-adventurers who built up the greatness of Hull; many of the dingy-looking offices contain splendid staircases and rooms adorned with excellent woodwork and plasterwork, showing them to have once formed part of dwellings which may fairly be called princely. One of the best-preserved of these has become a special show-place

from the circumstance of William Wilberforce having been born there, though the history of the house goes back for at least a century earlier. This is the building standing a little back, with a forecourt separated from the street by an old brick wall with high gate-piers; the house itself has curiously rusticated brickwork on its front, and a roof covered, like those of all the older buildings in the town, with red pantiles. There is good seventeenth-century panelling inside, and although now used as offices, the occupier, it ought to be said, is most obliging in the facility which he allows for its inspection. Nearly opposite, at the entrance to Bryant's-court, some half-timber houses, much be-plastered, appear to be of early seventeenth-century date. At Temple's Entry, a little further on, there is a fine half-timber front, belonging to what was once the King's Head, a celebrated inn; the timbering is still visible, and there are good carved brackets at the doorway, supporting an oriel. This house has a double projection of the upper stories, and was probably built in the fourteenth century. Several other remains of half-timbered houses exist up and down the street, but all in a much more damaged condition. No. 160, known as Maister's House, from the family of that name who formerly lived in it, is a really remarkable, and, on the whole, very well-preserved, example of a sumptuous town mansion of the time of George II. The exterior is severely unpretentious, but the richness of the interior is quite surprising. The central staircase, with its two tiers of surrounding galleries, and gracefully-designed octagonal lantern, could hardly be surpassed by any work of corresponding date; the iron balustrades, though somewhat singular, are full of character, and the whole of the woodwork is exceptionally fine. Most of the latter has, unhappily, been grained, and the effect of the delicate mouldings and carving nearly ruined thereby, but the general condition of the house appears so sound that it may be hoped that some one may think it worth while to come to the rescue with a judicious "restoration." Among other houses possessing good interior work of the seventeenth and eighteenth centuries may be mentioned Nos. 47, 49, and 66, while No. 44 has a noticeable brick front. Among modern buildings which attract attention are the Corn Exchange, by Messrs. Bellamy & Hardy, of Lincoln, with a heavy Corinthian front of dark stone; the Globe warehouse, by Messrs. Botterill, a strong, solid-looking, red-brick building of six stories, thoroughly "warehouse" in character without affectation; and Phœnix Chambers, by Mr. Jacobs, a corner block of offices with a canted angle, built of red brick and buff terra-cotta, and treated in a manner very suitable to its position in a narrow street.

Royal Institution. (The late Cuthbert Brodrick.)

Hull and Sculcoates Dispensary. (Messrs. Botterill, Son, & Bilson.)

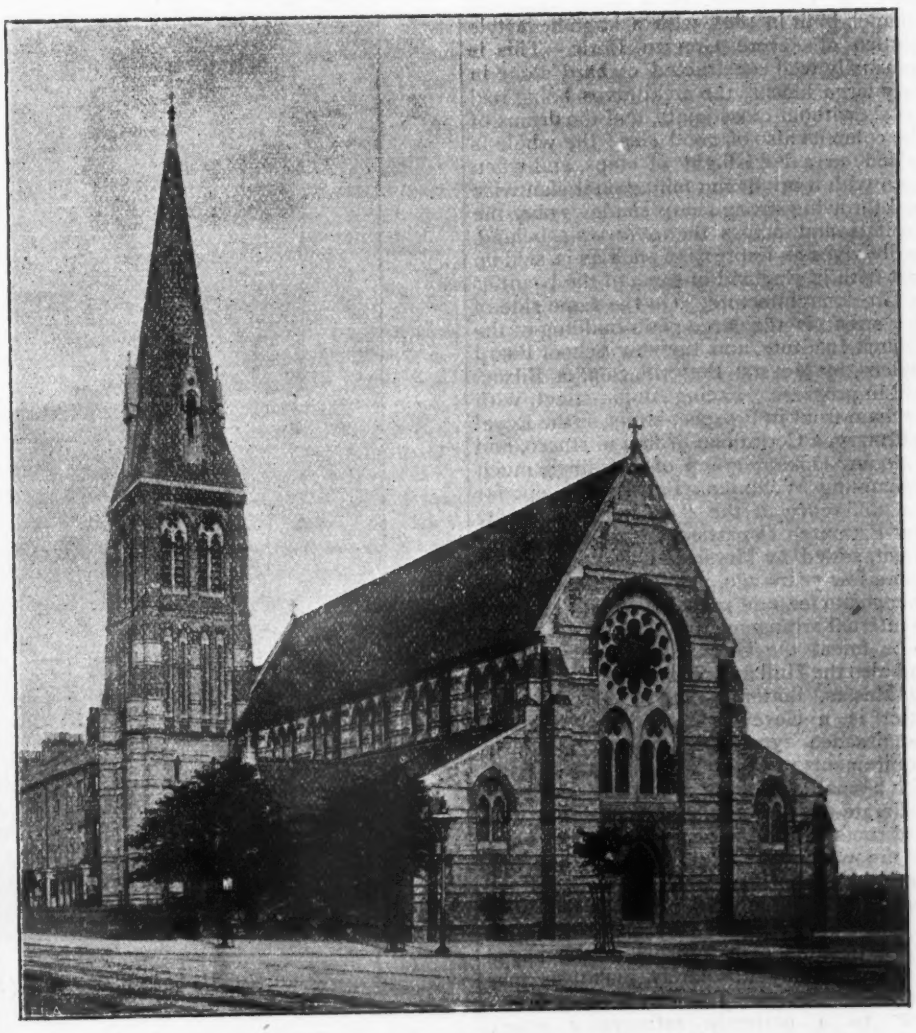
Returning to the banking quarter, we find in the appropriately-named Silver-street the offices of the London and Midland Bank, a tall stone building, plain and substantial, yet not quite banklike in aspect, by reason of the smallness of the ground-floor windows, and the great prominence given to those of the first floor. Facing it is an arcade of shops, L-shaped in plan, and communicating with Lowgate at the other end. At the corner of the short street bearing the strange and apparently unexplained name of Land of Green Ginger, the London and Yorkshire Bank, by Messrs. Smith & Brodrick, a rather striking building in red brick and stone, shows an adaptation of early French Gothic; it has a corner entrance, with the rounded angle of the upper stories corbelled out over. Just opposite the building of the Colonial and United States Mortgage Company, by Mr. R. Clamp, of florid modern Renaissance type, is prominent, but hardly pleasing; turning down Land of Green Ginger, No. 7, Messrs. Shackle's office, by Messrs. Smith & Brodrick, claims notice as a piece of well-designed work; it is entirely of red brick, except some plain stone lintels over the principal windows, and treated simply and sensibly throughout, with proper regard to materials and situation; though a small and unostentatious house, it is one of the most interesting and satisfactory commercial buildings in the town. Bowlalley-lane contains some large office blocks of no special merit, and we turn back into Silver-street, where, at its junction with Trinity House-lane, is a large and costly-looking building, just completed by Mr. W. W. Gwyther, of London, for the Yorkshire Banking Company; Ancaster stone is used for the facing, dark red granite for the plinth, columns, and entrance-arch, and an imposing result was evidently contemplated; unfortunately, however, the entire design is hard, mechanical, and uninteresting, strongly recalling the work done by the Post Office surveyors. The Trinity House in the same street, at the corner of the open space before the west end of Holy Trinity Church, is a very pleasant specimen of mid-eighteenth-century architecture, built in 1753-4. It is very quiet in effect, a two-story building with simple dressings and quoins of dark grey stone, between which the walling is plastered and painted cream-colour, all ornament being concentrated on a doorway of well-proportioned Roman Doric, and on the central pediment, which is filled with remarkably vigorous and appropriate carving, quite of the old man-of-war's figure-head type, representing the Royal Arms, supported by the stoutest, sturdiest, and most defiant-looking lion and unicorn ever seen, with Britannia and Neptune, equally boldly executed, in the angles; it is recorded that 100*l.* was paid for the carving of this pediment in 1758. Across the square is the venerable building which, for several centuries, was the Grammar School; it was built in 1578-83 (though the school had existed for a long time previously), and is entirely carried out in brick, even to the mullions and transoms of the windows. Several other examples of old brickwork, showing a free use of moulded bricks, still exist in this part of the town, such as the quaint little seventeenth-century house (now stuccoed over) in Dagger-lane. In Whitefriargate, the principal street leading out from the Old Town, and containing some of the best shops, we pass the office of the



Beverley-road Board School. (Messrs. Botterill, Son, & Bilson.)

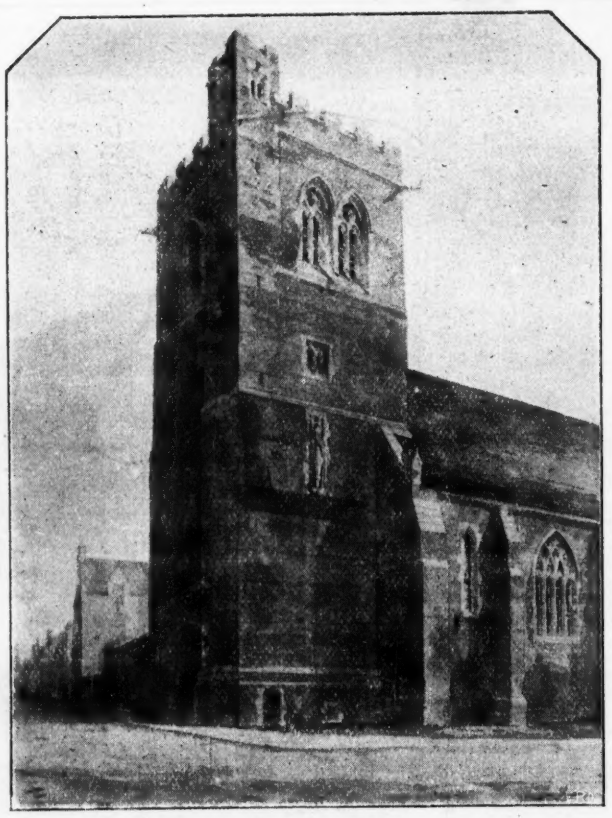
Yorkshire Banking Company, by Messrs. Lockwood & Mawson, with a large "order," heavy cornice, and the usual corner-entrance; also the Bank of England, a severely plain front of dark brown stone, with three tiers of square-headed windows and a row of dormers over; the piers are boldly rusticated, but there is no other attempt at ornamentation; and the Custom House, dated 1794, and a good specimen of its period, rather of "Adam" character. It was formerly an inn—the "Neptune"—and must have been a grand place in coaching days, but now even its exterior is spoilt by the ground floor on both sides of the archway leading into the court-yard having been turned into ordinary shops.

Crossing the swing-bridge between Queen's and Prince's Docks, the Dock Offices (see lithograph), standing on the quay of the former, are very well seen; in fact, no other building in the town enjoys such a prominent situation. It was built by Mr. C. G. Wray in 1871, and has a good deal of character, agreeing well with its important position and purposes; the three domes, raised well above the main block on high drums, are effective from every point of view, while the building has the somewhat rare advantage of having no back, or inferior elevation. The plan forms an irregular triangle, the face towards the dock having a convex curve, while the others are straight; a dome comes over each angle. The general treatment may be said to follow Venetian Renaissance models, and, although the building certainly looks best in distant views, its details, while not of a high order of merit, are fairly well proportioned and consistent. The Wilberforce monument is a conspicuous feature of this part of the town, consisting of a Doric column on a high base, with a colossal statue of the philanthropist on the top, rising altogether over 100 ft. high. The brick-built Church of St. John, just beyond, dating from 1791,

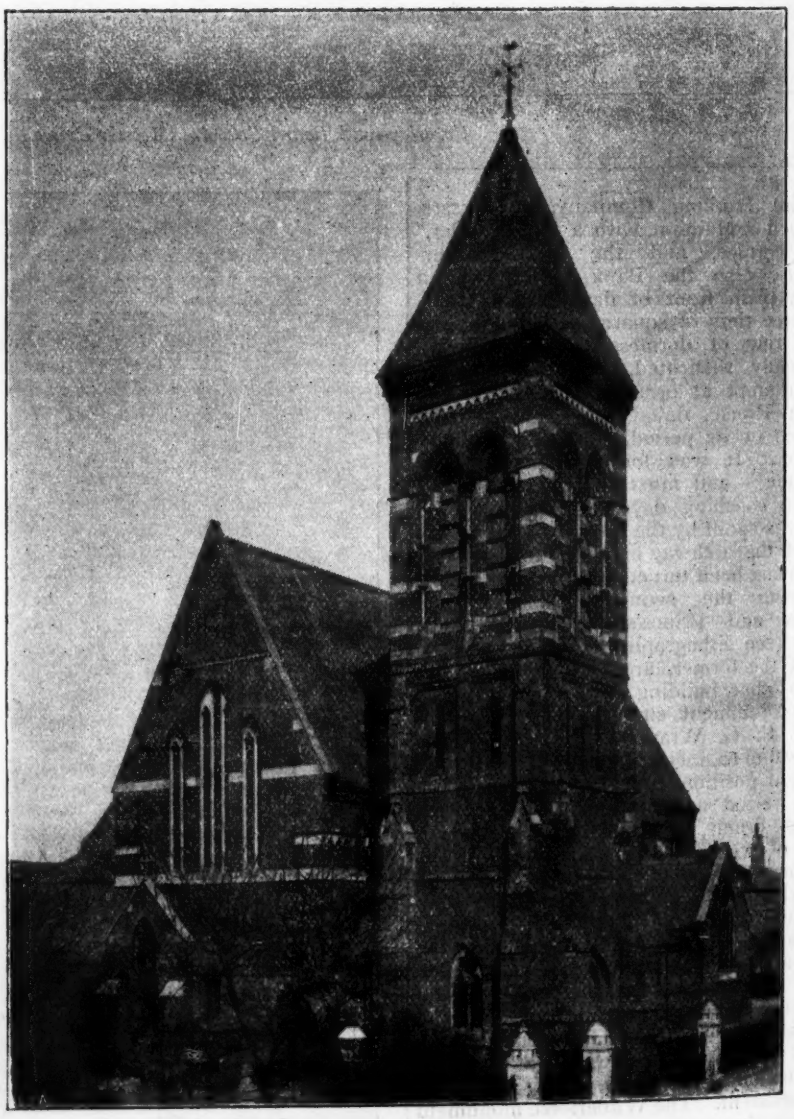


St. Matthew's Church. (Messrs. Adams & Kelly.)

could hardly evoke admiration, even from the most ardent lover of the "Later Renaissance"; its newly-built neighbour, "The Punch Hotel," by Messrs. Smith & Brodrick (see lithograph), deserves mention chiefly because its very florid face of brick and terra-cotta, of flamboyant Gothic character, could not fail to arrest the attention of the passer-by. From this point the far-spreading districts of modern Hull are approached by roads radiating in various directions, all absolutely level, and mostly of ample width. Turning first into Savile-street—a short street of good shops, the houses in which are old enough to possess, in many instances, the steep pantile roofs which must have made the town look so cheerful and picturesque before the dreary fashion of Welsh slating came in—no specially noteworthy buildings are met with, though the Savings Bank, by Mr. R. Clamp, a substantial stone building, occupying a good corner site at the end of the street, and also Savile House, with the adjoining restaurant, both by Messrs. Smith, Brodrick, & Lowther, stand out by their superior size and elaborateness. From Bond-street—very unlike its London prototype — where the Sculcoates Parochial Offices show a poor attempt at modern Gothic design, we turn into Albion-street to see the grandiose façade of the Royal Institution, of which Mr. Cuthbert Brodrick was the architect, in 1853. It is unfortunate that this important work, which is Roman Corinthian in style, and has for its chief feature a deeply recessed colonnaded portico, should both face the north and also have become a good deal blackened; much of the good effect it would otherwise have is lost by these accidents; still it is certainly striking, if only from its scale and boldness, though the details are by no means deficient in elegance. Taking it altogether, and considering the ideals of the period at which it was erected, it must be pronounced a highly meritorious work. In a strikingly contrasted position, on the opposite side of the street, is a Congregational Chapel, built in 1842, with a large hexastyle portico of severe Grecian Doric. This is unusually well constructed of hard stone in very large blocks, the architraves being real lintels without cross-joints, and the drums of the columns also of good size; the whole is raised on a bold flight of steps, and when seen with a bright sun falling on it slantwise and throwing strong sharp shadows over the capitals and across the *cella* wall behind, really gives an impression such as is seldom met with in England of some of the beauties of Greek architecture. On the same side of the street is the large plain building of the Church Institute, and the new School Board Offices, by Messrs. Botterill, Son, & Bilson, still in progress. Facing Albion-street, with its main front in Prospect-street, is the Royal Infirmary, a Corinthian design in stucco, and a gloomy-looking group of buildings, much resembling Wellington Barracks except for the difference in the "order." The new Out-Patients' Department, facing Brook-street, added by Messrs. H. Saxon Snell & Son a few years ago, is of much more suitable character, and probably equally superior in internal arrangement. In Baker-street are to be found the Gas Offices, by Mr. Clamp, and also the Hull and Sculcoates Dispensary, by Messrs. Botterill, Son, & Bilson. The latter is a clever adaptation of Flemish Renaissance types to everyday modern requirements; it is carried out in red brick, with a small amount of stone interspersed in moderate-sized blocks, and is covered with tiled roofs of good pitch. The woodwork of all the windows is painted white and very carefully proportioned, a most important, though often quite neglected, point in work of this class, where a very slight variation in the position of a transom or the shape of a pane may absolutely make or mar the whole design. The only serious drawback to a perfectly satisfactory result is the great depth (about 3¼ in.) of the local bricks; so long as these are used

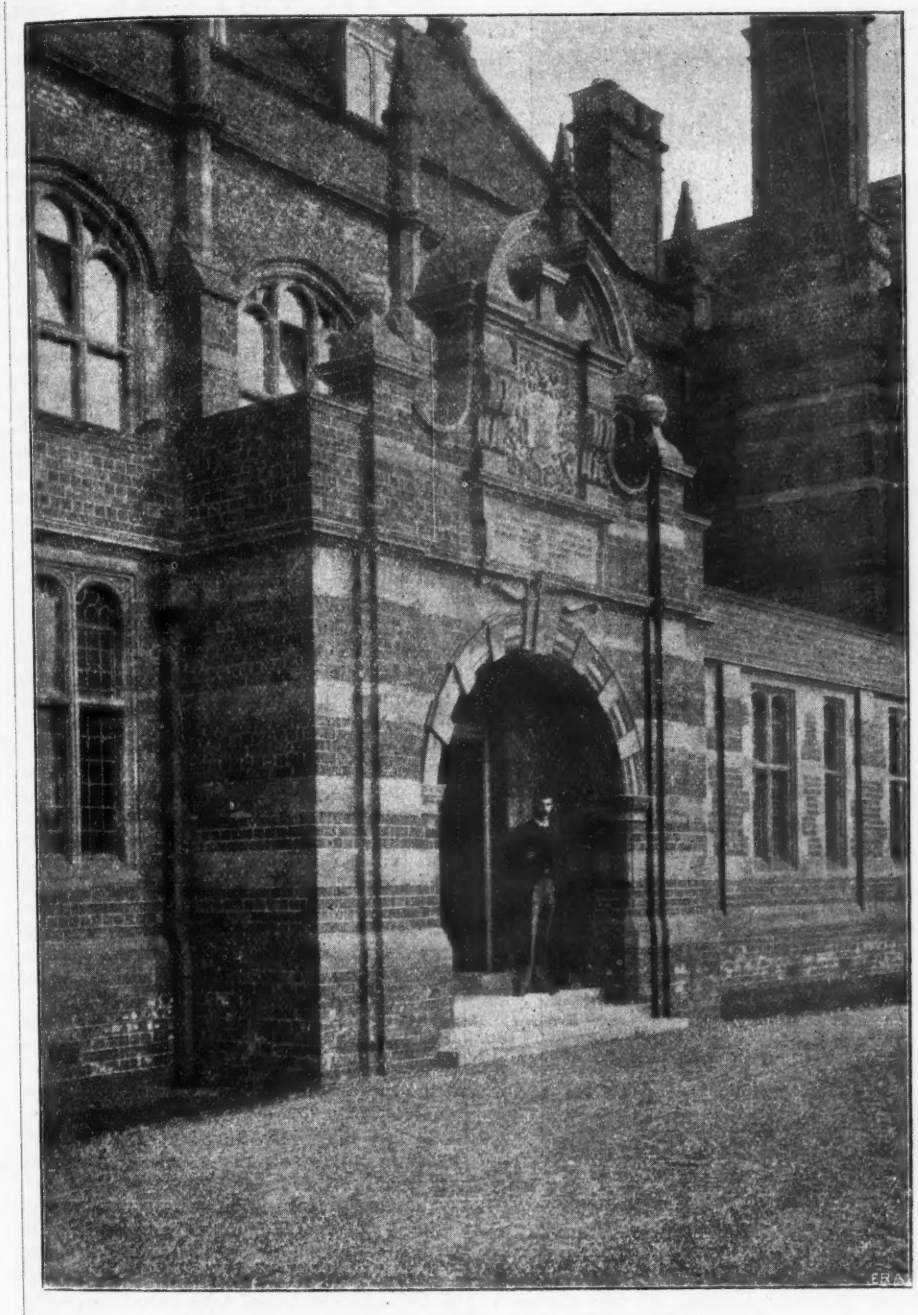


*St. Augustine's Church. (The late Mr. Gilbert Scott and Mr. Temple Moore.)**



All Saints' Church. (The late G. E. Street.)

* The tower is not yet built.

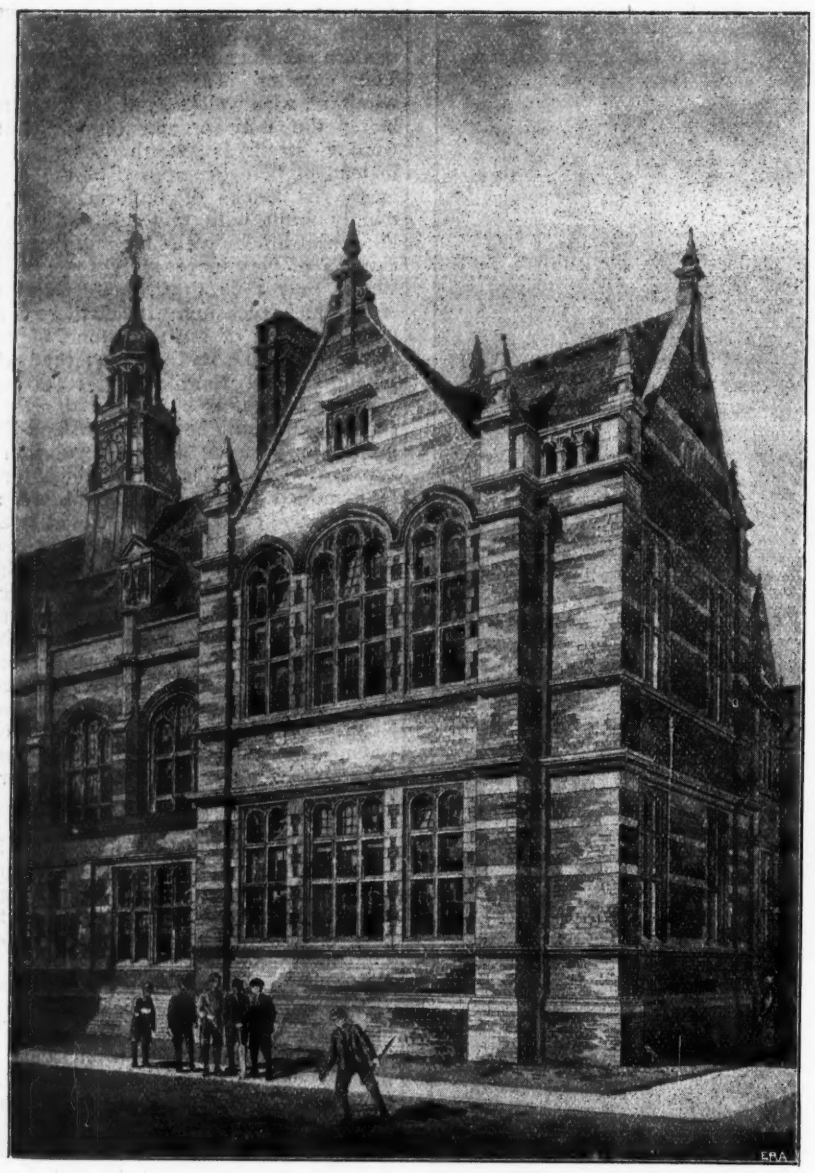


Porch, Hymers College. (Messrs. Botterill, Son, & Bilson.)

the true characteristics of Dutch or Flemish architecture can never be attained. The Sailors' Hospital, standing back from Prospect-street with a garden in front, is a quiet bit of modern "Tudor," with no special features. The Central Higher Grade School, in Brunswick-avenue, by Messrs. Botterill, Son, & Bilson, is a good piece of thoroughly modern work, imitating no particular style, but marked by sensible handling of materials, happy proportions, and refined detail. Near this a Board school of the ordinary grade, built in 1888, and, like a good many others in the town, somewhat resembling the London type in general appearance, but carried out in red brick with stone dressings, and with slated, though high-pitched roofs. A rather interesting group is formed by St. Paul's Church, with its vicarage, schools, and other dependant buildings. The church itself, by Mr. Dykes, is unusually good for its time, 1846, and though it would probably be classed as imitative Gothic, being of ordinary "lancet" character, really shows a good deal of genius in its designer. The detached tower, added recently, is not a very happy addition, but was probably starved in execution.

Beverley-road and Spring Bank, the two main thoroughfares into which Prospect-street divides, contain several of the large chapels, hardly meriting individual mention, which, with the Board Schools, form perhaps the most conspicuous features of the newer parts of Hull, owing to the lowness of the ordinary houses. In the former road is the large workhouse, by Mr. Lockwood, not much of which is seen from the street; and the Free Library, by Mr. Cheers, of Twickenham, a pretentious but unsuitable-looking design which would cause any critical mind more surprise than pleasure, though we believe that, not very long ago, it won the votes of a competition committee. The interesting group of almshouses of the Hull Municipal Charities Trust, by Messrs. Smith & Brodrick, are worth a visit. A few years since the various small almshouses in the Old Town had their Trusts brought together and their inmates removed to these new buildings, which are arranged in a quadrangle, with a common gate-tower and chapel; but with each body of pensioners in a block by themselves. The whole group is very picturesquely treated, the only fault being, so to speak, that it is *too* picturesque, too crowded with variety of materials and features; a little "weeding" of some of its exuberance would improve it vastly. Going on northward through Pearson's Park, newly planted, but prettily laid out, with some pleasant-looking detached houses set round it, we come to the best of the modern churches of Hull, St. Augustine's, at the corner of Queen's-road and Prince's-road, begun by Mr. G. G. Scott, jun., and continued by Mr. Temple Moore. It is not yet finished, as the tower is still unbuilt, and, judging from the drawing, will be a fine one; but the church is already far above the average of modern parish churches of the cheaper sort. The exterior is very simple, the large windows, with well-designed flowing tracery, being the only ornamentation; but the walling itself is worth attention, since instead of being composed of the ordinary large red bricks of uniform colour, it is mainly built with mottled and brownish kiln-burnt bricks, with here and there double courses of very narrow bright red bricks (or tiles?), only $1\frac{1}{2}$ in. thick, the result of which is extremely pleasing. Inside there is a very simple arcade of red sandstone, separating the single aisle from the nave; the walls are plastered, and the boarded roofs painted white; the floor is boldly paved, right up to the east end, with large red and buff tiles—a great improvement on the regulation "encaustics." There is some good furniture lately added by Mr. Temple Moore, and a particularly good font; stained glass is scarce at present, but what there is is excellent. Not far off may be seen an original and very pleasing example of domestic work by Mr. G. G. Scott, in a group of detached and semi-detached houses in Salisbury-street. A better treatment of moderate-sized houses of this class we have seldom seen.

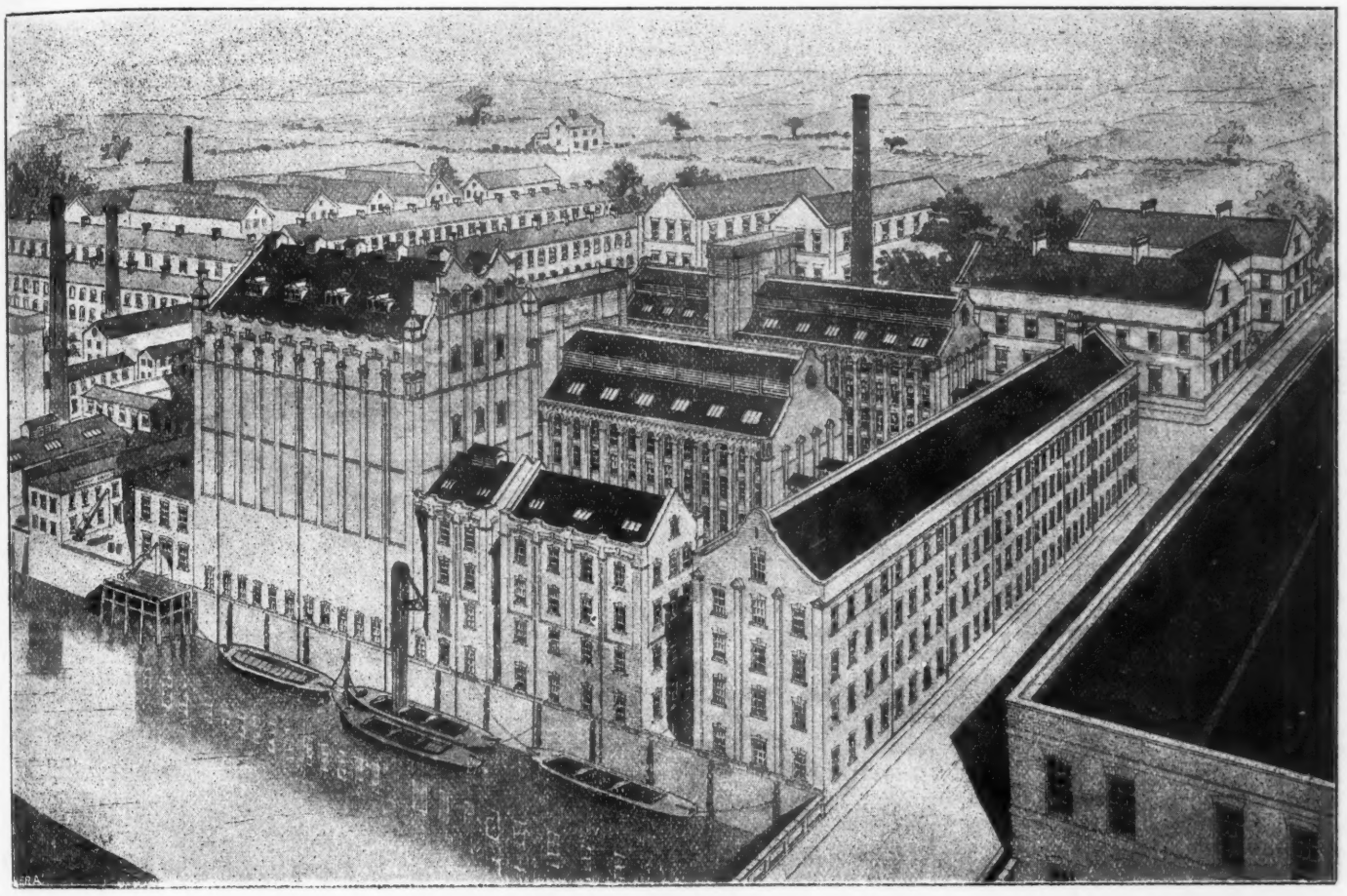
All Saints' Church, the parish church of Sculcoates, the northern division of the town, situated, by a curious coincidence, in Margaret-street, was built, together with the vicarage, by Mr. G. E. Street. As a specimen of his work it must be called disappointing, being by no means in his best manner; though not, according to modern standards of church-building, particularly hampered by lack of means, having cost, including the tower, nearly 10,000*l.*, it somehow fails of being impressive, either externally or internally; and, indeed, in several points, such, for instance, as the timbering of the nave roof, is lamentably weak. The chancel ends in a semicircular apse, which seems to have created quite a fashion in Hull for this somewhat un-English form of plan; almost every new church, with the exception of St. Augustine's, having followed it. The new buildings of the Grammar School, by Messrs. Smith & Brodrick, quietly treated in late Gothic style, are situated near All Saints, but in a retired corner where not much of them is seen. Hay's Flour Mill, in Grosvenor-street, is worth notice as a satisfactory example of a large building of a class to which it is difficult to give an exterior both practicable and consistent and yet agreeable. The architects were Messrs. Botterill, Son, & Bilson. In the course of Spring Bank, a wide street with a row of lime trees along the centre (planted over the old conduit which was once the only water-supply of Hull), we pass St. Jude's Church, by Mr. E. Simpson, an obviously cheap building of simple lancet type, carried out entirely in brickwork with the exception of a large traceried window at the west end, which rather spoils the general air of extreme simplicity; and also the Seamen's and General Orphan Asylum, a large comfortable-looking Elizabethan building, begun by Mr. Wyatt, and since added to, in perfect accord with the original design, by Messrs. Smith & Brodrick. Further on, standing alone in its own grounds of about thirty acres, formerly the Botanical Gardens, is Hymers College (see lithograph), the most important recent addition to the architecture of Hull. This is a large day-school for boys, liberally endowed by the late Dr. Hymers, the building of which was won, in an open competition, by Messrs. Botterill, Son, & Bilson in 1890; it was described and illustrated in the *Builder*, January 16, 1892. It forms an imposing pile, the great central hall, from which all the class-rooms and other rooms open, standing up in the middle with a tall *flèche* or clock-turret rising from its roof. The materials are red brick with Ancaster stone in dressings, bands, &c., and the design has been described as "a free rendering of the Jacobean style;" it is, nevertheless, an essentially modern production, and owes its



Hymers College: South-west Angle. (Messrs. Botterill, Son, & Bilson.)

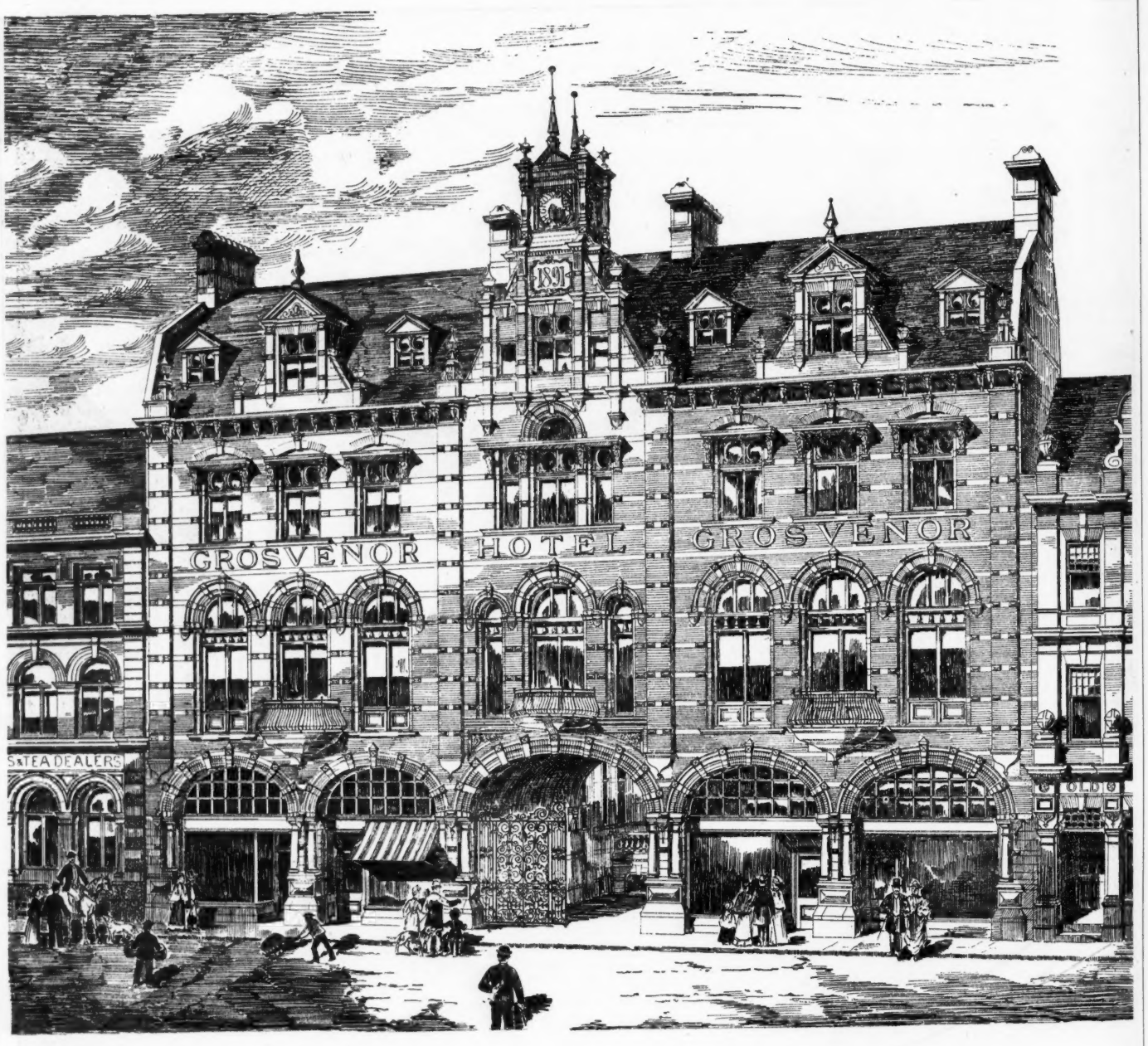
unquestionable merit rather to a fine sense of proportion, both in grouping and in details, than to any special reminiscences of old work which it suggests. Inside also the hall is the great feature, and is very effective with its exceptionally fine open timber roof. Southwards from Sprink Bank is Park-street, where may be noticed, among other public buildings, the Victoria Hospital for Children, by Messrs. Musgrave & Bingley, rather overpowered with multiplicity of features for its actual size, but of fairly agreeable aspect, with something of the cheerfulness which a hospital building ought always to possess; the high school for girls, by Messrs. Smith & Brodrick, a rather flat, early Gothic design, which is the better for a row of trees separating the buildings from the road; and, a little off the street, St. Stephen's Church, with a tall spire, one of the most prominent objects seen from the train on entering the town, but not worth a nearer view. The principal railway station, called the Paragon, with the Station Hotel adjoining, both owing their construction to Hudson, "the railway king," were designed by Mr. Andrews, of York, and are of good character for their time, with a certain massiveness and, almost, dignity, not unbecoming. Paragon-street, the main thoroughfare leading from the station, is a mean-looking street altogether, and probably the worst impression of Hull that can be obtained is that given by the few streets immediately surrounding the terminus. The only thing worth remark in this street is the singular and ambiguous name of a small public-house—"The March of Intellect!" From the railway-station the western districts are reached by Anlaby-road, in the course of which the costly florid ugliness of the pseudo-Gothic Wycliffe Chapel, at the corner of Campbell-street, forcibly challenges attention, making it a relief to turn down into the unsavoury region of the tanneries to see the simple, yet dignified, exterior of St. Thomas's Church, by Mr. Simpson (the interior, unfortunately, as with the majority of churches in the town, is locked up on weekdays). This is a later work than St. Jude's, by the same architect, and is a capital example of a really very cheap church for a cramped site. Returning to the main road, we pass a well-designed and appropriately severe-looking convent by Mr. Goldie, faced by a large workhouse by Mr. Lockwood, commendable for its unpretending plainness. Further on, the tower of St. Matthew's Church looks very well as seen for a long distance down the straight, level road; it is of far superior size and proportion to many modern spires, as it stands well above the height of the nave roof by the whole belfry-stage. The entire church, including the tower and spire, is built of white brick, the arches and weatherings being of red brick, which is also employed in bands in the walling; stone plate-tracery is inserted, with doubtful advantage, in the windows, the jambs and heads being of brick. Messrs. Adams & Kelly were the architects. From this point the Boulevard, a fine, broad street, with very wide footpaths, planted with trees—a real avenue, not a make-believe one, like most of the new so-called "avenues" in London—runs nearly straight for three-quarters of a mile towards the river. So far the buildings along it have not risen to the opportunities of such a street, consisting mainly of quite small and ordinary houses while a good many plots are lying vacant; the best ones are a higher-grade Board school, by Messrs. Botterill, Son, & Bilson, and a Roman Catholic Church, of curvilinear Gothic character, with a good interior, especially the open-timber roof, though externally it has the serious fault that the end towards the road is greatly over-embellished, making it a regular "show front," while the flanks "tail-off" miserably. Is Pugin's teaching quite forgotten among his co-religionists? Near the "circus" formed by the crossing of Hessle-road, is the West Hull Liberal Club, by Mr. T. Brownlow Thompson, and the Branch Free Library, by Mr. Gelder; not a very interesting building to look at, but preferable in every respect to the more ambitious libraries in Beverley-road and Holderness-road. St. Barnabas' Church, by Mr. S. Musgrave, is of a rather common type of modern "Early English"; it has the inevitable semicircular apse, which here looks very weak, as it has about twice too many windows. Hessle-road is also planted with trees for a good part of its length; it contains no really noteworthy buildings, though a somewhat extravagant corner shop, by Mr. Gelder, may certainly rank, as it probably aspires to, as the most showy piece of shop-building in the town, and the Alexandra Hotel, by Messrs. Smith, Brodrick, & Lowther, also catches the eye by its lavish profusion of materials—greenish-yellow faience on the ground floor, red brick and buff terra-cotta with cast "swags" in panels for the upper stories, and timber, rough-cast, and tiles to finish with. St. James's Church, just off Hessle-road, looks rather imposing at a distance, with its large western tower, but when seen closer proves to be a poor specimen of the early days of the Gothic revival, bad in its details, and chiefly built of white brick. Christ Church, Worship-street, more in the centre, is, with some differences in design, of the same character. In Great Thornton-street is a Wesleyan Chapel, by Mr. Lockwood (see lithograph), which, as an imitation of Greek models, is considerably above the average, and has distinctly a grand air; although actually rather a piece of scenery than true architecture. It is built in the semblance of an octastyle Corinthian temple as a centre, flanked by open colonnades connecting it with two smaller temples of the Doric order.

Going eastward from Savile-street, by way of George-street and Charlotte-street, nothing of much importance is seen for some distance, though many of the old Georgian houses in this quarter (the first expansion of Hull beyond the walled limits of the old town) are very pleasing examples of a quiet, orderly, and refined taste in street architecture, for which the feeling, as far as the general public is concerned, has been almost lost. In Charlotte-street in particular, some fine houses, probably built as residences when the great merchants first left their original homes in High-street, may be seen, now used as institutions or offices, such as those occupied by the Hull, Barnsley, and West Riding Railway Company, and the Young People's Christian Institute. St. Philip's vicarage, in this street, by Messrs. Botterill, Son, & Bilson, of modified Flemish character, is an agreeable bit of well-studied domestic work, excellently adapted to its situation; the neighbouring church, an earlier work of the same architects, is less interesting, so far as its exterior is concerned, though solid and not without dignity. Mason-street, behind Charlotte-street, also contains some nice, if not absolutely picturesque, old houses, and like many of the streets in this quarter is of a most comfortable width. Facing the end of it, at the corner of Jarrett-street, is a particularly fine corner house, of great size, apparently of eighteenth-century date, now a good deal mutilated in adapting it to its use as a Fire Brigade station. In the narrow street called Trippet, which follows the line of the River Hull, and leads up to the almshouses built on the site, and retaining the name of the Mediæval Charter



Flour Mills. (Messrs. Gelder & Kitchen.)

Girls' Industrial Schools, Park Avenue. (Messrs. Botterill, Son, & Bilson.)

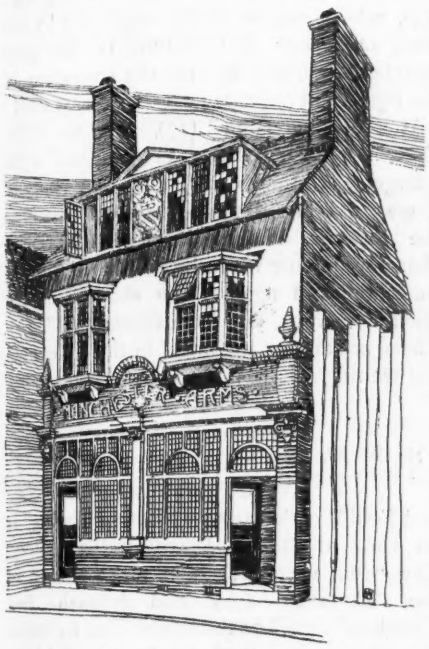


The Grosvenor Hotel. (Messrs. Gelder & Kitchen.)

House, some of the warehouses and mills are quite worth notice as works of architecture, notably Pool's warehouse, designed by Mr. J. King James, and the St. George's Mill. The view looking up the river from the North Bridge, where these tall buildings are seen rising sheer up out of the water, is really picturesque. Below the bridge Rank's Mill, by Mr. Gelder, is imposing from its huge bulk and immense chimney with head of glazed brickwork. An inn sign near the bridge, "The Greenland Fishery," recalls the days when whaling was an important occupation of Hull seamen. In Witham, leading out to the eastern suburbs, the most striking building is a Wesleyan Chapel, with a tetrastyle Ionic portico of vast dimensions, and built up of unusually large blocks of stone. A little Roman Catholic Church in Wilton-street, by Messrs. Smith, Brodrick, & Lowther, has some pretty features, but is practically ruined internally by its coarse and glaring painted decoration, applied in such a reckless manner as to seriously obscure the architectural design and to totally destroy all difference of quality in material. The Holderness-road is now entered on, a wide street with many new buildings rising along it; among these should be mentioned the James Reckitt Public Library, by Mr. Gelder; the Corporation Baths, designed in the Borough Surveyor's office, and still in progress; St. Andrew's Church, by Messrs. Adams & Kelly, commonplace in design, and almost inconceivably bad in detail, consider-

Higher Grade School, Craven-street. (Messrs. Botterill, Son, & Bilson.)

ing that it was built only twenty years ago; and, just off the main road, in Craven-street, a higher-grade Board school, by Messrs. Botterill, Son, & Bilson, similar in general character to those already mentioned, but of slightly more effective external design, and without doubt, after, of course, Hymers College, the most satisfactory example of school architecture in the town.*



The Manchester Arms.
(Messrs. Smith, Brodrick, & Lowther.)

NOTES.

Architecture in Parliament.

ON Tuesday we had the subject of the Government offices again discussed in the House, when Mr. Herbert Gladstone informed the country that it would be so much better if all the buildings were to be designed by the officials of the Office of Works, and cited the cast-iron Gothic of the new portion of the Record Office as an evidence of Sir John Taylor's ability to do better than any of the leading architects of the country. It would really seem that First Commissioners of Works (for Mr. Gladstone at one time held that office) are selected specially for their ignorance of architecture. The good sense in the debate was contributed by Mr. Bryce, who drew attention to the great importance of providing in the new Public Offices for comprehensive libraries, such as would be of use to the several departments—a suggestion which we hope will not be forgotten, and by Sir F. Powell, who seemed fully to appreciate the importance of the completion of the South Kensington Museum.

The Government Buildings Question.

THE following letter appeared in Wednesday's *Times*:—

"THE NEW GOVERNMENT BUILDINGS.

To the Editor of the 'Times.'

SIR,—We, the undersigned, who follow various branches of art, are naturally anxious that the great building schemes proposed by the Government should result in something that would worthily represent the architectural ability of the country.

We have, therefore, heard with dismay the utterances in Parliament of the First Commissioner of Works and the leader of the Opposition. Their disparaging criticism of Mr. Norman Shaw's New Scotland-yard seems to render it almost hopeless to expect anything from the present scheme but another architectural failure.

We desire to place on record our admiration of Mr. Shaw's building, and our opinion that of the public buildings erected by Government in London during the present generation it is the one of which London may be most justly proud.

Your obedient servants,

T. G. JACKSON, R.A.	H. H. ARMSTEAD, R.A.
L. ALMA-TADEMA, R.A.	J. C. HORSLEY, R.A.
ARTHUR W. BLOMFIELD, A.R.A.	FRANK DICKSEE, R.A.
	VAL. C. PRINSEP, R.A.
W. BUTTERFIELD, F.S.A.	G. H. BOUGHTON, R.A.
E. ONSLOW FORD, R.A.	ERNEST CROFTS, R.A.
JOHN BELCHER.	J. MAC WHIRTER, R.A.
THOS. BROCK, R.A.	BRITON RIVIÈRE, R.A.
PHILIP WEBB.	WALTER W. OULESS, R.A.
JOHN S. SARGENT, R.A.	
W. R. LETHABY.	ERNEST GEORGE.
HAMO THORNYCROFT, R.A.	JOHN FULLEYLOVE, R.I.
	WALTER CAVE.
WALTER CRANE.	J. T. MICKLETHWAITE.
JOHN F. BENTLEY.	PHILIP NORMAN.
GEORGE FRAMPTON, A.R.A.	HALSEY RICARDO.
	BASIL CHAMPNEYS."

It seems rather a pity, while they were about it, that the signatories did not say a word as to the general principle of the manner in which Government deals with architecture, instead of merely confining themselves to repudiating the judgment passed on the Scotland Yard building. Still, this is what may be called a good "test case"; members of Parliament have committed themselves to abusing a building which the majority of architects and artists of the day would point to as the best public building of the last fifteen or twenty years; and the perusal of the list of names at the foot of the letter may perhaps persuade even Sir William Harcourt and the First Commissioner that they have been pronouncing judgment on matters they do not quite understand.

Electricity and the Metropolitan Railway.

THE clause in the Bill of the Metropolitan Railway Company for the purpose of enabling them to use electricity has been passed by the Select Committee of the House of Commons. The only opposition to it was from the Great Western Railway Company, who were apprehensive that their interests would be affected. This was clearly a question of arrangement between the two companies. But we are afraid that, though the Bill will be passed this session, the public will have some time to wait before the change is complete. It is obvious that, with the best intentions, a change of this kind must take time, and as it is admitted that the change is primarily for the benefit of the public rather than of the shareholders, it is not likely to be put through with rapidity. It is certain, however, in the long run to be to the advantage of the company, since more persons will then travel by the underground lines. If the companies would light their stations by electricity, without delay, so as to give a clear light, it would be a great public convenience. At present, the stations throughout the underground lines can scarcely be said to be lighted: there is darkness visible.

New Church, Montmartre.

THE crypt of a new church at Montmartre, Paris, has just been completed and opened for service. The building, at the intersection of Rue Véron and the Passage de l'Elysée des Beaux-Arts, and with a façade towards the Place des Abbesses, was commenced last year; it is dedicated to St. Jean, and is intended for the population of Lower Montmartre, for the access up the steep hill to St. Pierre is long and inconvenient. M. de Baudot, Inspecteur-Général of Diocesan Buildings, is carrying out the work, which will be executed entirely in iron framework filled in with hollow bricks into which liquid cement is poured. It is the first church in Paris to be built in this form of construction.

Magnetic Ore Concentrators.

ONE of the most remarkable of the industrial processes that have become established during the latter end of the nineteenth century is the extraction of certain metallic ores from their native bed by means of magnetism. For some time past Mr. Edison has been running a large plant at Edison, in New Jersey, where an immense quantity of low grade magnetite exists. After the rock in which the iron ore occurs has been reduced to powder, the magnetite is attracted away from the sandy gangue by means of large magnets, and is then made into briquettes for treatment by the iron producer. The bulky by-product of sand is said to have found much favour with American builders on account of its clean and angular grains; it is also utilised as sand for locomotive engines, and for other purposes. The Wetherill magnetic machines concentrate not only magnetite, but many other metallic ores that until recently have not been regarded as magnetic materials. Thus it has been found possible to attract hematite, limonite, pyrolusite, siderite, and many chemical salts of iron, manganese, and chromium, from their admixture with non-magnetic minerals by means of magnetism. In fact, the sulphides of iron appear to be the only compounds of that metal which cannot be extracted by this process. Space will not permit a detailed account of this new adaptation of electro-magnetism to the service of man, but fuller particulars may be found in the proceedings of the principal chemical and engineering societies during the last two or three years especially those of America.

The Cost of the Electric Light.

THE paper on the cost of generating and distributing electrical energy, an abstract of which was read by Mr. Robert Hammond at the Institution of Electrical Engineers last week, is an excellent one. It represents the results of an immense amount of labour in tabulating and arranging the various items of cost in generating electricity at the several supply stations in the United Kingdom so that they are readily comparable with one another. This was rendered possible by the Electric Lighting Act of 1882, which makes it compulsory on the part of every lighting station to publish an annual statement of its accounts, giving the various items in minutest detail. As the paper takes up 132 pages of the Society's transactions and yet has been condensed to the utmost consistent with clearness, we can do no more than mention one or two of the points touched on. Mr. Hammond proves that the cost of electricity supply has been and is still gradually decreasing, and that it has not yet become simply proportional to the price and calorific value of the coal used. For example, the "works costs" per unit sold last year at Edinburgh, Leeds, and Manchester were only 0·63d., 0·78d., and 0·94d. respectively, and the total costs per unit sold were 1·13d., 1·50d., and 1·45d. Mr. Hammond, who designed the works at Leeds, ventured to predict that

* This series of illustrated articles was begun in our issue of September 26, 1896. A list of those towns already dealt with, and particulars of future arrangements, will be found on page xvi.

when the output of these works was five times what it was at present then the works costs would be reduced to a halfpenny per unit sold, and the total costs would be only three farthings, so that a penny per unit to the consumer would be then quite possible. The author's remarks on depreciation, specifications, tests of the efficiency of generating plant, &c., embodying as they do the results of his almost unrivalled experience are well worth considering by all engineers. In the subsequent discussion Mr. Wordingham, of Manchester, stated that the Corporation now only charged 1½d. per unit for motor purposes, and for lighting purposes their charges were practically the same as those at Brighton.

Bow Church.

THE Bishop Suffragan of Stepney makes an appeal, which is supported by the National Trust Society, for a sum of 3,700*l.* (whereof 900*l.* is at present subscribed) for a restoration of this church, erected in the fourteenth century, and consisting of a tower, chancel, nave, and two aisles. Having already described the architectural features of the fabric and its condition in our article of November 21, 1896, we need only say now that the Restoration Committee have adopted plans prepared, we understand, by Messrs. W. A. Hills & Son for execution under the superintendence of Sir Arthur Blomfield, who in 1891 carried out, at a cost of about 350*l.*, some interior repairs, and has since drawn up a report upon the existing state and needs of the structure. The church was originally built as a chapel-of-ease for Stepney parish on a license granted by, it seems, Ralph de Baldock, who was Bishop of London in 1306-13; in 1719 the chapel was consecrated for use as a parish church, with a dedication to St. Mary. It contains some interesting monuments, and has some old Flemish glass; the eight bells are believed to be those cited in a familiar nursery rhyme. A curious tradition obtains that children's bodies used to be deposited in a loft above the chancel roof.

Art in Illuminated MSS.

ON Tuesday evening Sir E. Maunde Thompson gave an interesting lecture at the Society of Arts on the subject of art in English illuminated MSS., treating it as presenting a kind of epitome or representation of the artistic progress of the country during the mediæval period. He recognised two main types of art in illuminated books; the northern, which was of more or less Celtic character, and depended for its effect mainly on conventional ornament and grotesque animals, and the southern, in which figure subjects were predominant. A very interesting chronological series of illustrations was given with the lantern, which formed a kind of summary of the progress of and changes in the art, and brought out especially the curious development of conventional foliage designs and their sometimes rapid and almost sudden changes in style. The lantern illustrations could not of course show the colour which is the most important element in illumination, but they showed at all events the design. In regard to the figure subjects, while they are no doubt historically interesting when seen as a series, we cannot keep up with the lecturer's admiration of many of them for their own sake. They are interesting experiments by artists who meant to express something serious, but whose figure drawing was grotesquely bad. The only figure shown that was worth admiration from the modern point of view was the one, from an example of late date, of the angel in the Revelations casting a millstone into the sea. This is a grand design *per se;* the others are only admirable in their intention, making large allowances for the incapacity of the draughtsman; and it is an ill-regulated enthusiasm which regards them as pure works of art.

M. Lachenal's Ceramic Work.

OWING to some oversight, as M. Lachenal informs us, in regard to communications to the Press, our attention was only drawn almost at the last moment to the exhibition of his ceramic work at the Hanover Gallery in Bond-street, which has closed this week, and has hardly attracted the public attention it deserved. The name of M. Lachenal will be familiar to the readers of our notes from France as that of an eminent French ceramic artist; not a manufacturer merely, but one whose productions are all his personal work, in design and modelling. The collection at the Hanover Gallery was an interesting one, curiously different from anything of the kind that one generally sees in London. It consisted largely of pieces of ware for decorative effect merely, not for use; some of them with a little too much suggestion of the "article de Paris" about them—for instance, the bowl of which the sides are formed by a procession of ducks in a circle; but many others distinguished by great originality of inventive fancy, besides beauty of colour and execution. One of the largest pieces, a crouching female figure with her back to the spectator, apparently repulsing a crowd of evil countenances, forming a bas-relief behind, is a really poetic conception. There were various charmingly modelled heads; a large grey vase with two female figures in alto-relief floating, as it were, on the ground of the vase; some splendidly-modelled and coloured birds, and a crowd of smaller objects of varied and fanciful invention. The pervading taste of the collection is not what would commend itself, perhaps, to the purists of English decorative art, but it is interesting as representing the French view of what can be done with decorative ceramic work; of the high talent displayed in the work there could be no two opinions, and it is well to be led out of our usual groove sometimes. Next time M. Lachenal exhibits in London, we hope his work will have more attention than it seems to have secured on this occasion.

Mrs. Allingham's Exhibition.

WE thought Mrs. Allingham had arrived at perfection in her art, but in this last exhibition of her works, now on view at the Gallery of the Fine Art Society, she has surpassed herself. With each new exhibition her work seems to have gained in refinement of perception and execution; and though some of the seventy-six drawings now exhibited may be picked out as more remarkable than the rest, there is not a thing with which a fault can be found. Such a work as "Near Staunton St. Gabriels, Dorset" (23) seems the perfection of landscape representation in water-colour—so true in effect as to be almost an illusion to the eye, and yet entirely without "realism" in the wrong sense of the word. The peculiar excellence of Mrs. Allingham's style lies in the fact that she has learned to combine almost minute truth and correctness of representation with a perfectly broad and free style of handling. Among other drawings which may be specially mentioned are "A Primrose Copse" (2), "Cottage near Farringford" (14), where one is struck especially by the truth of colour and texture in the grey thatched roof, and the minute execution of the figure and animals near the foreground; "At a Cottage Gate" (17), "By the Lilac Tree" (24); "Old Manor House Kent" (35), a larger work than usual, and a fine study of a grey old half-timbered house; "Feeding the Pigeons, Whittington Court" (45), a charming picture made by a child in a white frock relieved against the shadow of the open doorway; and "On Blackdown" (68). These are among the finest in the collection, but we might have picked out a score more.

Mr. Wyllie's Exhibition.

A COLLECTION of studies of sea and shipping, by Mr. W. L. Wyllie, under the title, "Fair and Foul Weather from a Floating Studio," is on view at Messrs Dowdeswell's gallery. The "foul weather," as in "The mouth of the Thames" (47) and "North Sea Trawlers" (43), has the best of it as far as the sea is concerned: the calm sea subjects seem a little wanting both in regard to colour and to what one may call liquid quality in the water. A large number of the sketches are concerned with shipping as well as sea, and in painting shipping Mr. Wyllie is without a rival among English artists; one of the most characteristic is "Barge race entering the Medway" (77). The collection is well worth a visit.

Mr. Maclean's Gallery.

THE Spring Exhibition of oil paintings at Mr. Maclean's Gallery in the Haymarket contains nothing so remarkable as the two Roman Gladiator subjects by Gerôme in the last exhibition, and in fact most of the works exhibited are of rather a commonplace order. The most important is Bouguereau's large painting of a nymph and cupids under the title "Whispers of Love," suggesting that Bouguereau would be one of the greatest artists of the day if his colour were as fine as his drawing. The most characteristic and original pictures exhibited are the two larger works by Ter Meulen, "Minding the Flock" and "The Wood-cutter's Return," which are really fine. An Egyptian scene by Gerôme, and Mr. Brangwyn's very clever but eccentric painting of the crowd on "The Custom House Quay, Venice"—rather what the French call a *croûte*—are among the works exhibited.

The French Society of Water-colours.

THE "Société des Aquarellistes Français," which has hitherto held its annual exhibitions in the Georges Petit Gallery, has this year migrated to the gallery in the Avenue des Champs Elysées. The exhibition is an exceptionally interesting one. Among the best works is M. Maurice Leloir's picture of the Pont au Change in the eighteenth century. M. Jean Geoffroy exhibits some amusing studies of infants from life. M. Boutet de Monvel, who also excels in representations of child life, affects rather the manner of the "Primitifs"; in this class of work his illustrations to the fable of the

miller, his son, and the ass, are exceedingly humorous. Among other things to be noticed are the broad and vigorous drawings by M. Guiraud de Scévola, the studies by M. Besnard of Sara Bernhardt in one of her parts, the military caricatures by M. Albert Guillaume, the drawings by M. Jeanniot, and some of the works in water-colour by deceased artists—Meissonier, Gustave Doré, Heilbuth, and Louis Leloir. It may be observed that in regard to the general character of subjects treated this is a curious contrast to what we are accustomed to see at an English water-colour exhibition, where landscape almost always predominates.

East Ham Public Offices Competition.

WE are glad to find that the East Ham District Council have acted on the suggestion in our last issue, and have withdrawn the word "probably" from the sentence in their advertisement in reference to the appointment of a professional assessor, and that it is the intention of the Council to appoint an assessor. They will get a much better competition under those circumstances.

ARCHITECTURAL SOCIETIES.

LEEDS AND YORKSHIRE ARCHITECTURAL SOCIETY.—The annual meeting of this Society was held at the Albert Hall, Leeds, on the 21st ult., when Mr. George Corson, who occupied the chair, was re-elected President, and Mr. Tweedale and Mr. T. Butler Wilson were appointed vice-Presidents. The members elected to the council were Messrs. Hobson, Braithwaite, France (Bradford), W. Carby Hall, Beevers, C. B. Howdill, G. W. Atkinson, and A. E. Kirk, together with Messrs. E. Birchall, W. H. Thorpe, E. J. Dodgson, Perkin, Bulmer, and Watson (Wakefield), past-Presidents. Mr. F. W. Bedford was re-elected secretary.

THE GLASGOW ARCHITECTURAL ASSOCIATION.—At a meeting of the Glasgow Architectural Association on Tuesday—the President, Mr. W. T. Conner, in the chair—the Rev. David Watson delivered a lecture on "Puvis de Chavannes, and the Mural Decoration of Municipal Buildings in France." The lecturer gave an exhaustive criticism of the artist and his art, characterising Chavannes as the greatest mural decorator of modern times. His most important works were very fully illustrated by limelight views. At the close, Mr. Watson expressed the hope that the municipality would, in the decoration of their Municipal Buildings, employ M. Chavannes to initiate the scheme of mural decoration.

COMPETITIONS.

SCHOOLS, WADEBRIDGE.—For the Memorial Schools at Wadebridge, Cornwall, fourteen sets of designs were received from different architects, and those prepared by Messrs. Kerley and Ellis, of Exmouth, have been selected. Tenders for carrying out the work are being invited.

NEW FREE CHURCH, ABERDEEN.—In the limited competition for designs for new Free Church, Beechgrove-avenue, Mile End, Aberdeen, the professional assessor (Mr. J. Murray Robertson, Dundee) has now reported. Messrs. Brown & Watt's (architects, Aberdeen) plan has been considered the ablest, and they have been appointed architects for the building; while the first premium is awarded to Mr. A. Marshall Mackenzie, A.R.S.A., and the second to Messrs. D. & J. R. McMillan, architects, both of Aberdeen. The selected plan shows a church in Kemnay granite, seated for 800 persons, with a hall at the east end to accommodate 400 people. A feature of the building will be a tower and spire—total height, 175 ft. (tower 104 ft., and spire 71 ft.). Messrs. Brown & Watt have also introduced large windows in the church. The estimated cost of the new buildings is 8,000*l.*

REBUILDING OF BOSCOMBE HOSPITAL.—The designs submitted by Mr. G. A. Bligh Livesay, A.R.I.B.A., architect, Boscombe and Bournemouth, have been awarded the first premium in this competition. The assessors were Messrs. Young & Hall, of London.

Illustrations.

WALTHAM ABBEY.

THE Abbey of Waltham Holy Cross owed its foundation, according to legend, to the miraculous discovery of a flint cross, having the image of the Saviour, at Montacute in Somersetshire. When found it was placed in a waggon drawn by oxen, which, on the mention of Waltham, commenced their journey eastward to the banks of the Lea, where Tovi, then lord of the soil, and standard-bearer to the King had property, and a house. The cross was set up, and became an object of great veneration, and Earl Harold, brother of the Confessor, founded an establishment here for Secular Canons, and dedicated the church to the Holy Cross. This dedication was coupled with that to St. Lawrence in the time of Henry II.

The architectural history of the abbey may be divided into two periods—firstly, the building of its church and the foundation of a house of Secular Canons by Earl Harold before the Conquest, dedicated in 1062; and secondly, its remodelling by Henry II. in 1177 as a monastery of Canons Regular of the Order of St. Augustine, the changes that were made at this time, and the subsequent additions and alterations down to the time of the Dissolution of the Monasteries.

We cannot in the space at our disposal go into the question which has been much discussed from time to time, as to whether the Norman work at present existing is or is not a portion of Harold's church. Mr. Parker, Mr. Freeman, and more recently Mr. J. A. Reeve have given their views at length, and to their papers we refer our readers. Harold's church was of some magnificence in its detail, if not remarkable for great size, and the theory that the Norman style might very well have influenced him in his design would in some measure account for the distinctly Norman detail of the nave now existing, considering the time at which it is supposed to have been built. That there is no documentary evidence or allusion to any rebuilding in Norman times is also another point in favour of the theory that we still have left some of the early church. The extent of the presbytery of this date can only be conjectured. It was in all probability apsidal. The late Wm. Burgess made a plan shewing a presbytery of four bays with an apse, and beyond it a small apsidal chapel, with two side chapels, as at Gloucester and Norwich, approached from the ambulatory. This plan has been adopted by the Ordnance Survey in their map of Waltham. There is, however, no architectural evidence to support this theory. All the data we have to go upon are the remains of the "crossing" and transept and the existing nave. The central tower was 35 ft. square, carried on four richly-moulded arches. The length of the transept was comparatively short. The west wall of the south transept still exists, and, assuming it had no eastern chapels, its width would be that of the central tower. The nave was of seven bays, and over the aisles in the westernmost bays were probably towers. The former existence of these is evident by the thickening of the wall at this point. Foundations have been discovered on the north side of the nave, and two doorways, one Norman, and the other (that at the east end of the north aisle, now the entrance to the modern vestry) of fourteenth century date, show that buildings stood on what is now part of the garden of the vicarage, and probably formed part of the first establishment of Secular Canons founded by Harold.

The second period—that commencing in 1177, with its conversion by Henry II. from a house of Secular Canons to one for Canons Regular of St. Augustine—has, if fewer architectural remains, considerable interest.

In a paper by Mr. Edmund Littler, written in 1859*, on Waltham, a plan is given showing foundations, which are described as having been found "twenty-two years ago." These foundations we have shown on the large ground plan. They consist of a broad foundation wall running from the junction of the north transept with the presbytery to a distance of about 130 ft. eastward. At this point is a garden wall, built with old materials, and running at right angles with the foundation described. A little distance further south, and in a line with the old wall of the south aisle, was another foundation or fragment of wall. There is little doubt that these are fragments of the presbytery as remodelled. Whatever the plan of Harold's presbytery might have been, and however much of it was retained within, there seems no doubt that the later extension, after it had become an Augustinian house, had a square eastern termination. Partly, possibly owing to the existence of buildings already on the north side of the nave, but more probably owing to the close proximity of the town, the cloister of the new monastery was placed on the north side of the presbytery, and in this point may be compared with the planning at Rochester, where the cloister was on the south side of the presbytery. The whole of the site of these monastic buildings is now known as "Abbey Gardens," but by carefully examining the site, and with the assistance of the general plan given, which has been based on the Ordnance Survey, it will not be difficult to fix the position of the various buildings. The extent of the cloister court is probably accurately marked by the present garden wall, making allowances for the position of the presbytery aisle, which encroaches on it on the north. Immediately opposite the church, on the north side, was the frater, kitchens, &c., and at the north-east angle of the court there still remains a building which is undoubtedly of Henry II.'s time, and formed an approach or passage to the cloister from the north. Its west wall was the east wall of the frater, and at its north-west angle are traces of a staircase. A wall of varying thickness, with traces of arches of later date, runs for a considerable distance south of this passage, and marks the east wall of the cloister. On this side was the chapter house, and at its northern end, near the passage already described, is a thick wall running east and west, pierced with windows of apparently much later date, with broad inner splays.

The Abbot's house might have occupied the west side, and the outer court, with its chief entrance, was to the north-west. This gateway we shall refer to again. The vaulted passage is of two bays, each 14 ft. square, with the vaulting remaining in a very perfect state. At its north-west angle is a wall running north for a distance of 19 ft., at which point are traces of another return wall on the east side, showing that the passage was originally probably almost double its present length.

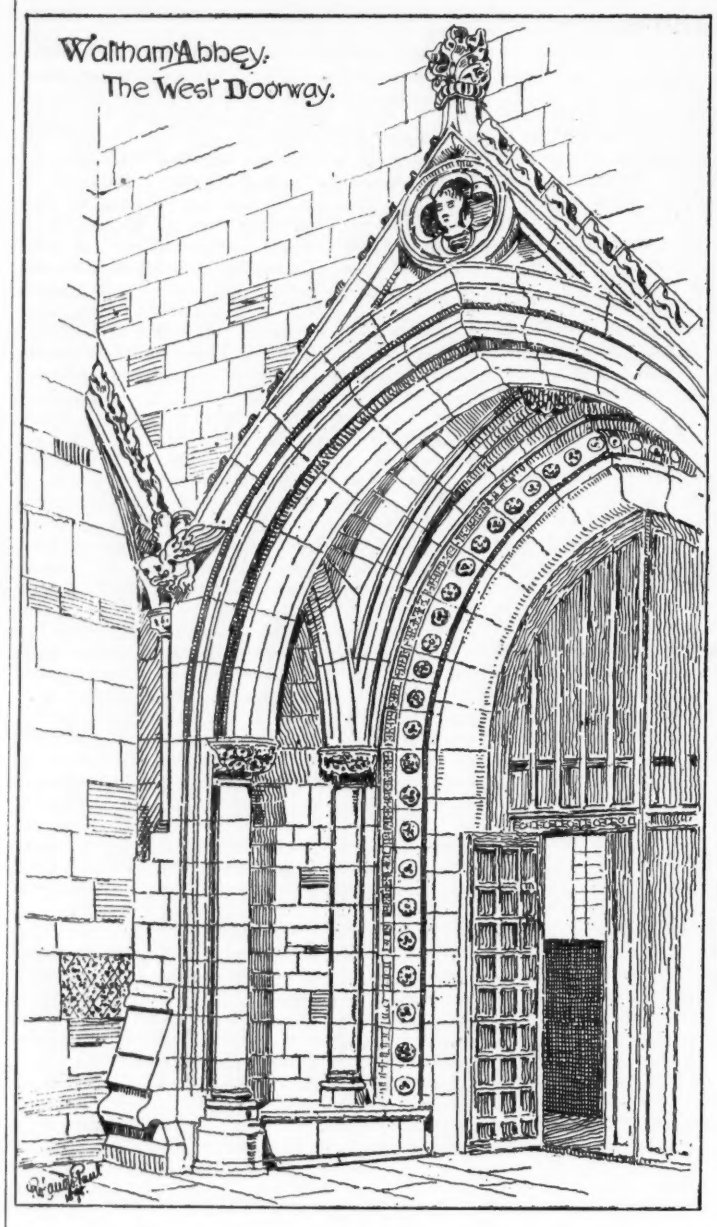
The thirteenth century has left no mark on any of the buildings that now exist. But during this period the presbytery of the church was doubtless much enlarged. Harold's presbytery was probably destroyed to make way for a new presbytery, such as is indicated by the foundations already referred to, and in accordance with the plan adopted by the Canons Regular of St. Augustine. The "Lady Chapel"—probably referring to the chapel dedicated to the Virgin at the east end of this new presbytery, was dedicated in 1188 by William de Vere, Bishop of Hereford,* and there is a further record of a dedication in 1242, which probably marks the completion of the work.

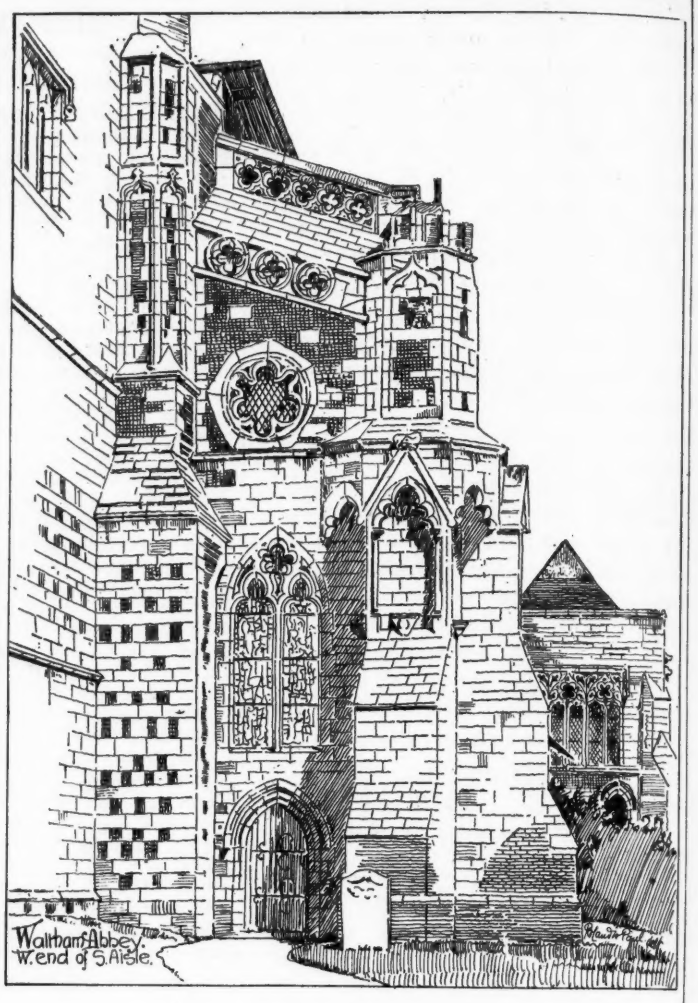
In the fourteenth century the west front was rebuilt, and late in the century a chapel, dedicated to the Virgin, was built in the angle formed by the junction of the south transept and south aisle of the nave.

The west front, when perfect, must have been a very fine composition. From foundations quite recently discovered north of the present tower (see plan), it seems clear that the Decorated front followed pretty nearly the same lines as the Norman front. At the angles of the aisles were double buttresses, gabled and canopied above, and carrying octagonal turrets. In the centre was a large doorway, flanked by an arcade. This was divided from the aisle by massive buttresses as a support to the main Norman arcade. The aisle walls themselves had a circular window with curious tracery high up at each end, apparently more used to light the passage in the thickness of the wall than for lighting the aisle itself, and above, the wall was finished with an open quatrefoil parapet. Traces of the west window can still be seen in the east wall of the present tower. The central doorway is a very beautiful composition, ornamented with ball flowers and roses. Over is a crocketed gable. The tower built, in the reign of Queen Mary, against this front has covered up a good deal of its detail. We give illustrations, however, of the west end of the south aisle and the western doorway, and reference to the plan will show the probable planning of the front

* "Transactions of Essex Archæological Society," vol. ii.

* Gentleman's Magazine, April, 1860, p. 384.





when perfect. In its lower stages the present tower appears to be built rather against the front than actually bonded into it, and much may still exist behind. Above, however, the new work overlaps, and is bonded more into the Decorated work, so that it is now impossible here to recover the original design of the upper part of the front. The materials used were flints and clunch, and brickwork has been introduced in places. These materials occur again in the Lady Chapel, which is of slightly later date than the west front, although in all probability it formed part of one scheme of design.

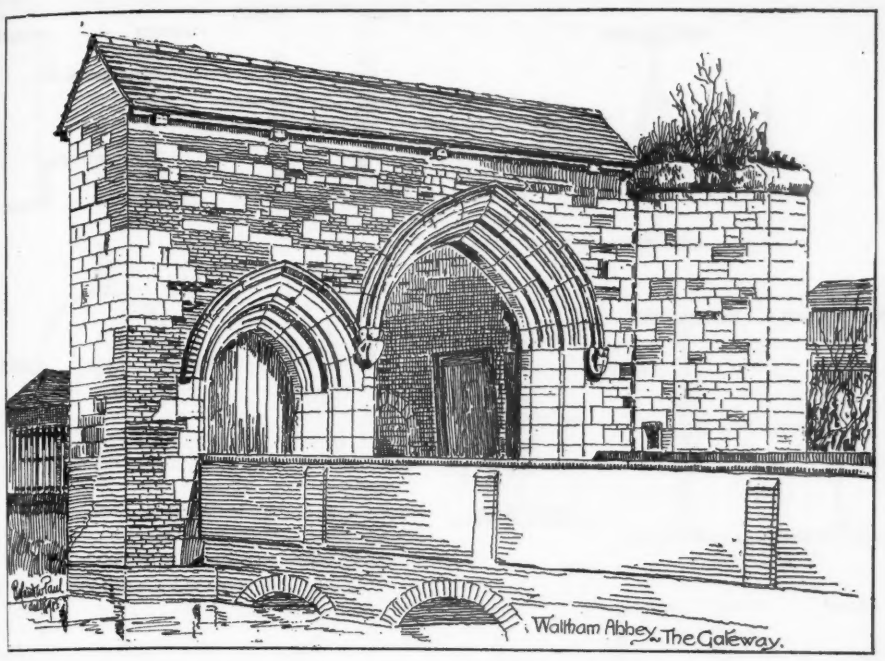
It is two bays in length, each bay subdivided by lesser buttresses and lighted by two windows. At the west end is a large square-headed window. The chapel measures 42 ft. in length and 21 ft. in breadth, being thus a double square. It was apparently never vaulted, but it is raised on a vaulted crypt, in good preservation but much disfigured by vaults, and by being used partly as a coal store. It is 8 ft. in height from the present floor to the crown of the vaulting ribs. The chapel was restored in 1860 by the late Wm. Burgess, and the tracery of the windows on the south side is entirely new, but part of the work in the beautiful west window is original. This window shows in the illustration of the front of the south aisle. The entrance is now at the west end near the south-west angle, and is approached by a flight of eight steps. The crypt entrance is at the north-west corner. At the period of the building of this chapel the Norman wall of the aisle was pierced by a large arch, and two of the Norman windows blocked up.

Nothing of importance seems to have been done in the Perpendicular period. In the church there is one window of late Perpendicular character in the north aisle, and the remains of the screen with its two doorways, under the west arch of the "crossing," is, apparently, of fifteenth century work. The main entrance to the monastery, approached by a bridge (modern) across the mill stream, about a hundred yards north of the west front, is of early Perpendicular work. Two walls remain, the front pierced by two four-centred arches, large and small, and the south wall with a blocked doorway in its centre leading to the room on this side. At the junction of these walls, at the south-west angle, is an octagonal turret. This, on the ground level, has a small window commanding the approach, and just below it are to be seen the remains of the original bridge and its parapet. An upper chamber remained at the beginning of the century, and there was a corresponding turret at the north-west angle. The label terminations have angels holding shields. That on the south bears the arms of England and France quarterly, but is much mutilated. The charge on the other shield has entirely disappeared.

At the Dissolution the presbytery and transepts of the church, and the monastic buildings were destroyed. The nave, used as the parish church, with its altar against the screen wall under the west arch of the crossing, was retained, and the Lady Chapel adjoining it, which in later times was used as a school, as was the case at the Abbey of St. Alban. To this retention of the lady chapel we owe the preservation of the west wall of the south transept against which it was built.

The central tower fell, and a western tower was built, in the time of Queen Mary, largely with old materials, and with a Decorated doorway, probably brought from some destroyed portion of the church or monastery, inserted. In 1778 the belfry seems to have been taken down, but was restored in 1798. In 1860 considerable repairs to the church were carried out by the late Wm. Burgess. The east wall (under the west arch of the "crossing") was rebuilt in a style altogether out of keeping with its surroundings, the Lady Chapel was repaired and its windows restored, and the second pier of the south nave arcade, from the east, was largely rebuilt, it having sunk owing to defective foundations. The present flat ceiling of the nave is also of this time, with painted panels by Mr., now Sir, Edward Poynter, P.R.A. Since that period a reredos has been added at the east end, and a memorial screen introduced (1886) in the large arch between the nave aisle and Lady Chapel.

The general design of the nave is shown in the interior view, taken from the south-east angle of the south aisle in front of the Denny tomb, looking north-west. The chief points to be noticed are: the flutings of the great columns, said to have been at one time filled in with brass; the absence of the inner order of the triforium arcade, formerly carried by the centre column which at present supports nothing; the variations in the design of the Norman work in the clearstory; and the treatment of the two westernmost bays (one of which shows in the view between the columns). In the fourteenth century the arch of the arcade was removed in these bays, and a segmental arch thrown across to support the clearstory. Besides being ugly in itself, it considerably weakened the walls, as is evident by the general tendency to lean westward visible in this part of the church. The south aisle also is considerably out of the perpendicular, but this is probably owing to bad foundations. In the wall of the triforium of the second bay from the "crossing" is still a portion of the beam on each side, which probably carried a "Rood." A screen of "Decorated" date spans the north aisle at this point, and two steps lead up to a higher level. On the opposite side, in the wall, is a recess, the original use for which is not apparent. During the restoration, however, some fragments of either a reredos or tomb were found in this recess, and they have been built into the east wall of the south aisle. They are of beautiful Decorated work, of clunch, and much resemble the work in the Queen Eleanor and Crouchback tombs in Westminster Abbey. Near the south doorway, and in the north wall of the west tower, are several fragments of very beautiful diaper work. The modern east wall is built over the old screen wall, which at this point crossed the church,



dividing the monastic from the parochial church, and on the east side are still to be seen the doorways which flanked the altar. The chief monuments are shown on the plan; a cross slab and a matrix of an abbot's brass in the north aisle, a tomb with effigies to Sir Edward Denny and his wife, 1599, at the east end of the south aisle; and a monument to Robert Smith, 1697, in the north aisle. The font, which formerly had arcaded sides, has been reworked, and is of no interest. All the fittings are modern. There are some interesting traces of a large fresco on the east wall of the Lady Chapel, two brackets, and the remains of the transept buttresses. The ground plan we give has, as regards the existing church, been based on a plan by Mr. A. B. Plummer with the monuments added, and also the foundations lately discovered at the west end. The lines of the presbytery, the foundations discovered, and the transepts have been based on a plan by Mr. Edmund Leitler, given by him in Vol. II. of the Essex Archæological Transactions;" and a general plan of the site of the monastery is given reduced from the Ordnance Survey, with the porch and approach to Lady Chapel, since taken away, omitted. The plans of the gateway and vaulted passage are to the same scale as that of the church, and have been measured specially to complete the illustrations of what now remains of the buildings. The total length of the church would have been less than 300 ft. The nave is 106 ft. in length, the central tower was 35 ft. square, and the length of the presbytery, assuming that the present wall stands on the old eastern wall, was 133 ft., giving a total length of 274 ft.

The arms of the Abbey, shown on the plan, were *Arg.* on a cross engrailed *Sa*, five crosses, crosslet, fitchée *or*. Another appears on a seal *Ag.* two angels volant *or*, supporting a cross Calvary *arg.*

North of the entrance gateway to the monastery are the fishponds, in good preservation, and near them the remains of a fourteenth century stone bridge with ribs, locally known as "Harold's Bridge," and said to have originally led to the stables.

In the *Builder*, October 18, 1879, will be found a series of measured drawings by Mr. A. B. Plummer, including a longitudinal section, showing the north side of the church, an elevation of the south side, and various details of mouldings, windows, and other features in the church. Those wishing a more complete knowledge of this interesting monastery, and the arguments that have been advanced in support of theories for and against the nave being a part of Harold's church, should refer to the late Professor Freeman's paper in the "Transactions of the Essex Archæological Society," Vol. II., where is also a paper by Mr. Edmund Littler on "The Church and Monastery," and also Mr. J. A. Reeve's paper in Vol. II. of the "Proceedings of the St. Paul's Ecclesiological Society" (1890). "A Guide to the Abbey," with much information, has been compiled by Mr. W. Winters, which is still to be obtained in the town.*

HULL ARCHITECTURE.

THE three lithograph plates under this general title form a portion of the illustrations to the article on the architecture of Hull, published in the present issue, and are all noticed and commented on in the course of that article.

THE ARCHITECTURAL ASSOCIATION:

CONSTRUCTIONAL STEELWORK.

AN ordinary fortnightly meeting of this Association was held in the Meeting-room of the Royal Institute of British Architects, No. 9, Conduit-street, Regent-street, on Friday last week, the President, Mr. Hampden W. Pratt, occupying the chair.

The minutes of the last meeting having been read and confirmed, Messrs. C. C. King and S. J. B. Stanton were elected members of the Association.

On the motion of Mr. C. B. Carvill, junior honorary secretary, a vote of thanks was accorded to Mr. T. Dinwiddy for allowing the members to visit the New Cross Baths. The visit to-day (Saturday) to the baths in course of erection at Pitfield-street, Shoreditch, and to the Free Library adjoining, was also announced.

The Chairman called attention to a demonstration on stained glass by Mr. Christopher Whall, on Monday, the 4th instant, at 7 o'clock, at the Central School of Arts and Crafts, Regent-street. Admission by ticket, to be obtained from the Hon. Secretaries of the Association.

Mr. Howley Sim, senior hon. secretary, announced that the members' Soirée and smoking concert would be held on April 29, at the Café Monico, Piccadilly Circus, to which members would be admitted free by ticket, and members' friends on payment of 2s. 6d.

The Chairman said that the Conversazione this year was not so much a conversazione as it usually had been, and very little opportunity for social intercourse was given on that occasion; but the Soirée, a varied programme for which was in course of preparation, would present a good opportunity for meeting friends.

Mr. Thos. C. Cunnington then read a paper on "Constructional Steelwork," part of which we print this week, as follows:—

"Until recent years the subject under consideration was generally considered to be within the sphere of the 'civil engineer' only, but with the various developments both in character and in extent of recent buildings and requirements, it has to be seriously considered by the architect. In buildings of the 'warehouse' or 'factory' class, the construction is comparatively simple. The complication, both as regards loads and construction, arises where the several parts of the same building are occupied by several different classes of tenants and devoted to different uses. In dealing with a subject of this class, many points have to receive consideration independently of safety of the building, and utility of the various sections for their requirements. Where the interior of various rooms is decorated, the construction has to be confined within the limits of the proposed treatment and internal architecture. In city buildings, where space and light are of the most paramount importance, every thought and care has to be taken with the view to limiting the columns, stanchions, girders, and floors to the minimum sections consistent with their carrying power. In the first place we will consider interior columns and stanchions with their several connexions and joints, as upon them depends principally the stability of the superstructure. Interior columns and stanchions form one of the most important steps in the modern problem of design, and greater variations are probably to be found in them than in any other features of steel construction. Each of the several forms has its own adherents, and the many types of connexions between the columns and stanchions, and with the Floor systems, permit of an unlimited choice. We will endeavour to investigate the more prominent forms, and point out the advantages and disadvantages of each. The most satisfactory for general and specific cases may then be selected as combining the desired features. The relative advantages of the various sections are of the greatest importance, as affecting economical and successful design. In actual practice the treatment of the different shapes will be found to vary greatly with the designer, not only in the relative value of the sections, but in the treatment of any one section. In the first place the formulæ differ greatly, not in fundamental principles perhaps, but in the treatment being often empirical, and containing factors deduced from some special case. These formulæ, also, generally assume ideal loading, which seldom occurs in the actual building, and none, or very few full-sized tests, have ever been made on the effects of eccentric loading. The general principles which govern the resistance of built columns may be summed up as follows:—

1. The material should be disposed as far as possible from the neutral axis of the cross-section, thereby increasing 'R' (radius of gyration).

2. There should be no initial internal stress.

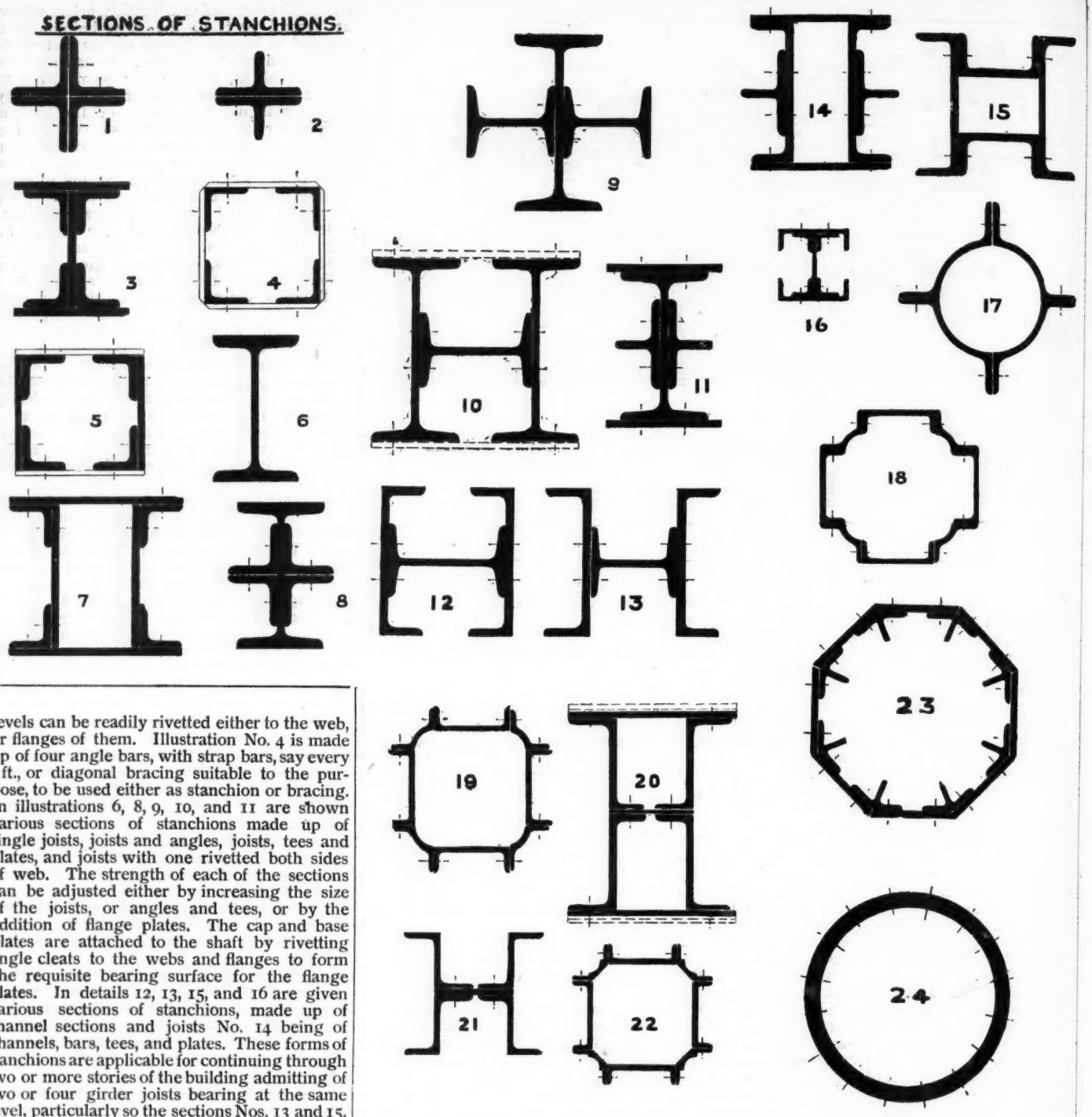
3. The individual portions of the column or stanchion should be mutually supporting, and

4. The individual portions of the column or stanchion should be so firmly secured to each other that no relative motion can take place, or they will fail as a whole.

From experiments, the closed column and stanchion is stronger than any open one, due to the fact that the edges of the segments are mutually supporting when held in contact by complete closure. Therefore the circular-built column is undoubtedly the most favourable form for compression, because the capacity of columns of equal areas varies as the metal is removed from the neutral axis. It must also be remembered that any form of column or stanchion, having a maximum and minimum radius of gyration, is not economical for use under a single concentric load, as the calculations must be based on the minimum radius of gyration. The metal represented by the excess of the maximum radius of gyration is, of necessity, disregarded, and part of the section is thus lost or wasted when we consider the ideal efficiency of the column; but practice does not always support theory, and many other questions besides mere form arise in connexion with the judicious choice of a section. The form of stanchions and columns most generally in use is given upon the sheets. You will observe that No. 1 section is made of four angles, rivetted back to back; No. 2, of two T-bars, also rivetted back to back. The caps and bases of these are easily formed by either forging one of the flanges of each bar at right-angles to the stem, or rivetting forged angle-seatings to the stem to receive cap and base plates. In illustrations 3, 5, and 7, these stanchions are made up of angle-bars and plates rivetted together as indicated. The strength and size can be either increased or decreased as circumstances require. The caps, bases, and flange plates of these forms are attached by angle cleats rivetted to the plates, angles, and webs. Bearings for joints or girders at intermediate

* The series of the "Abbeys of Great Britain" is continued this month with illustrations of "Waltham Abbey." For the list of Abbeys which have already appeared, and or particulars of future arrangements, see page xvi.

SECTIONS OF STANCHIONS.



levels can be readily rivetted either to the web, or flanges of them. Illustration No. 4 is made up of four angle bars, with strap bars, say every 4 ft., or diagonal bracing suitable to the purpose, to be used either as stanchion or bracing. In illustrations 6, 8, 9, 10, and 11 are shown various sections of stanchions made up of single joists, joists and angles, joists, tees and plates, and joists with one rivetted both sides of web. The strength of each of the sections can be adjusted either by increasing the size of the joists, or angles and tees, or by the addition of flange plates. The cap and base plates are attached to the shaft by rivetting angle cleats to the webs and flanges to form the requisite bearing surface for the flange plates. In details 12, 13, 15, and 16 are given various sections of stanchions, made up of channel sections and joists No. 14 being of channels, bars, tees, and plates. These forms of stanchions are applicable for continuing through two or more stories of the building admitting of two or four girder joists bearing at the same level, particularly so the sections Nos. 13 and 15. Sections Nos. 17, 18, and 19 are made up of flanged quadrant bars, flanged quadrant bars and channels, the diameter of 18 and 19 can be increased and decreased as occasion requires by using smaller or larger sections of channels. Sections 18 and 19, whilst retaining the minimum diameter, can be very considerably increased in strength by adding plain or bulb-shaped tees, plain bulb-shaped angles, or by the addition of plates, either inside or outside of the channel bars. Section No. 22 is made up of channels and Lindsay's special angles, or plain angles. This particular section was very successfully used in the West Australian Bank, Cornhill. In this particular instance they were 21 ft. 6 in. long, 11 in. diameter, made of four 5 in. by 3 in. channel bars and four 3 in. by 3 in. by ½ in. angle bars. In order to suit them to the respective loads, the strength of part of them was increased by an additional 1 in. plate rivetted to the back of the channel on the inside. Two of these stanchions, one the light and the other the heavy section, were tested at Messrs. Kirkaldy's works, and admirably withstood the compressive strain to which they were subjected. Upon the light section 158 tons were applied, and upon the heavy section 237 tons were applied, each of them, together with the caps and bases, being made in the usual manner; that is, without any special preparation for testing. With reference to section No. 18, there is a difficulty in rivetting up these stanchions if of small diameter. The forms of stanchions shown in sections Nos. 20 and 21 readily adapt themselves to purposes of construction of high buildings, where several floors have to be considered, and supported by the same stanchion. The section can easily be made to suit any number of loads and floors, by either increasing or decreasing the diameter, or increasing or decreasing the sectional area. These sections have found particular favour with the American architects and engineers in the construction of their high buildings from the fact of their easy adaptability to their specific requirements, to their form and construction, and from the fact that they can be readily encased with fire-resisting materials independently of being made up of bars that are either kept in stock at the mills or can be generally quickly supplied.

The drawn steel columns as illustrated on Wm. Lindsay & Co.'s sheet are made from 4 in. up to 24 in. diameter and from ½ in. to 1⅛ in. metal in one piece, excepting the flanges forming caps and bases. They are made in lengths not exceeding 21 or 22 ft., and are generally used in lengths not exceeding in height one high or two short stories; when they are superimposed, the single joist girders bear upon the flanges, and are attached. When columns of larger diameter are required and girders either of double joist compound girders or rivetted plate girders are used, the columns are made to seat on the girders, the girders abutting and being continuous, the flanges of the caps and bases being bolted to the girders. Ornamental caps and bases, either in cast iron or other metal, can be readily adapted to these drawn steel columns, to suit the several styles of architecture. The great advantage of these columns is that you get the greatest amount of carrying power for the minimum diameter and thickness of metal, and this point deserves consideration when space is an object, or where shipment has to be considered. One of these columns was tested at Messrs. Kirkaldy's with most excellent results, the length being 14 ft., 7 in. diameter, and 1-in. metal, the calculated safe load being 92 tons. It was tested up to 180 tons, practically without any movement, and no injury was observable to the material under microscopical examination. Columns shown in details Nos. 23 and 24 are built up of steel plates and T bars, and curved steel plates for large diameter columns, heavy constructions; or, where they are exposed, their form admits of being increased almost to any diameter and strength. The cap and base flange plates are attached by angles rivetted to shaft, and the flange plates rivetted to the angles. In special cases an additional plate is put on, the outside extending from 12 in. to 14 in. from the ends before putting the flanges on for purposes of additional strength. The steel stanchions shown on Wm. Lindsay & Co.'s sheets combine the principle of the ordinary angle-bar stanchion and the column; the bars are rolled in such a manner as to form a hollow shaft, and the metal is placed at as great a distance from the central axis as possible. They are made in the form shown, of four bars, or, for additional strength or diameter, plates or bulb bars are

inserted between the flanges of the angles. The cap and base flanges are attached to forged bent plates, or angles rivetted to shaft. These stanchions have been extensively used, as, independently of their strength, comparatively with their diameter and sectional area, they can be easily encased in fire-resisting material, either rectangular or circular shape, to suit the architecture of the building. Taking one 14 ft. long, 8 in. diameter, the safe load is 80 tons, and generally, in practice, the full load has been placed upon them, and proved satisfactory. To increase the size of the bases and the bearing surface area of the various steel columns and stanchions referred to, to provide for heavy or extreme loads, they rest upon cast-iron bases, formed to suit each special requirement. The cast bases may either rest upon joist foundations, hereafter referred to, or upon adequate stone bases and concrete foundations, the columns and stanchion bases being bolted down to the cast-iron bases.

The Fireproofing of 'Columns' and 'Stanchions.'

As columns and stanchions carry the greatest concentrated loads found in modern buildings, the proper fireproofing of these becomes a most important subject for consideration; unfortunately, in only too many cases is this slighted or omitted, even to a very dangerous extent, as has been proved in numbers of instances. Many systems have been introduced, and both the 'hard tile,' the 'porous tile,' 'terra cotta,' and concrete have been used extensively. The requirements in the adequate fireproofing of columns and stanchions are:—

1. The material must be indestructible by fire.

2. The material must not be heat-conducting.

3. The material must be so secured to the columns or stanchions that it cannot be dislodged. The use of hard fire-clay tiles is only to be recommended when such tiles are hollow, with a sufficient and proper air-space around the metal column or stanchion, and even then experience seems to show that the hard tile is in no way so satisfactory under great heat as the porous kinds. The application of cold water in combination with heat has also proved the hard tile far less reliable in case of conflagration than the porous tile, as the hard tile is very apt to crack off under such conditions. The use of solid blocks of porous tile well bedded against the metal column or stanchion or solid pumice concrete seems to be highly satisfactory. The requirements for fireproofing the interior columns and stanchions by the Chicago ordinance are defined as follows:—

(1) 'The coverings for columns or stanchions shall be, if in brick, 8 in. thick; if of hollow tile, one covering at least 2½ in. thick.

If the fireproofing is made of porous terra-cotta it shall be at least 2 in. thick, whether hollow tile or porous terra-cotta is used; the courses shall be so anchored and bonded together as to form an independent and stable structure.'

(2) 'In all cases there shall be on the outside of the tiles a covering of plaster with Portland cement, or of other solid cement of equal hardness and efficiency when set.'

(3) 'If plastering on metallic laths be used as fireproofing, it shall be in two layers, of which the first shall be applied in such a manner that the concrete or plaster will cover the entire external face of the column or stanchion, while the space between the two layers shall not be less than 1 in.

The metallic laths shall in each case be fastened to the metallic firings and the plastering upon same shall be made with cement.'

Foundations for Columns and Stanchions.

In designing the foundations for columns and stanchions for a building, where they rest upon a yielding stratum, proper provision must be made for the uniform distribution of the weight. In cases where the loads vary the foundations should be proportioned according to the different loads, so that the bearing per unit of ground area will be equal and a uniform settlement of the structure assured. Where the loads are excessive an excellent foundation for columns and stanchions can be formed with rolled steel joists, either in a single bed or more; the foundation for them being prepared by a suitable bed of Portland cement concrete of ordinary depth, then placing the joists thereon.

Where the unusual loads are to be supported the joists may be crossed in two or more directions, each at right angles, their distances apart from centre to centre varying from 9 in. to 24 in., according to circumstances—*i.e.*, length of their projection beyond the masonry thickness of concrete, estimated pressure per square foot, &c. They, however, should be placed at least far enough apart to permit the introduction of concrete filling between the joists. The most useful application of this system of foundation is on sites where a thin and comparatively compact stratum overlies another of a more yielding nature. By using joists in such cases, the requisite spread at the base may be obtained without penetrating the firm upper stratum or carrying the footing courses down to an unusual depth. In covering the joists with concrete, 6 in. should be left at the ends and sides of them and 1½ in. to 2 in. on top. A convenient way of doing this is to make a plank frame of the same size as the concrete bed, and at the proper height and perfectly level; after this is filled it is made for the next courses, and so on; the whole exterior being rendered with Portland cement so that no metal is exposed.

The method of calculation for joists used in foundations may be stated thus:—

The arms or projections of the two lower courses are fixed by the lengths of the upper ones, and by the dimensions of the sub-soil area; hence the question is how many joists are required.

Let y = projecting arm of any course.
a = width of supporting area.
l = total load on footing.
M = bending moment on one side of layer.

Then the length of joist $= a + y + y = a + 2y$.

Load on $y = \frac{l\,y}{a+2\,y}$ and since the distribution of the load on every layer is uniform, we have

$$M = \frac{l\,y}{a+2\,y} \times \text{lever arm} \frac{y}{2} = \frac{l\,y^2}{2\,(a+2\,y)}$$

In calculating the lower course, y becomes a known quantity and M an unknown.

The usual spacing where three tiers are used is

15 in. for lower tier.
12 in. for middle tier.
9 in. for top tier.

For any other spacing of pressure than given, M can be found from the formula

$$M = P \sqrt{\frac{s\,b}{12}}$$

When P = the projections in feet for the several tiers of beams.
b = the allowable bearing capacity per square foot of ground in tons.
s = spacing in inches.

The method in regard to the calculation of such footings is still an unsettled question, as some engineers claim that the action of the concrete filling, with its tendency to bind the iron and concrete together, causes the foundation to act as a whole, and thus possess a moment of resistance much greater than the sum of resistance of the individual layers. But in view of the uncertainty of such assumption the method of calculating all moments about the edge of the casting would seem more logical as well as being on the safe side. Two illustrations are exhibited of this class of footings. The smaller one, 15 ft. 6½ in. square base, is a copy of a footing used in the 'Marquette Building,' Chicago, for a load of 410 tons, the base of cast iron is 3 ft. 6 in. by 4 ft. resting upon five 20 in. joists 100 lbs. per foot each and 14 ft. ½ in. long. These 5 in. joists rest upon fourteen 15 in. joists 41 lbs. per foot each. The other, with base 15 ft. 6½ in. by 19 ft. supporting two stanchions, is taken from the same building, the load on one stanchion is 181 tons 8 cwt. and the other 250 tons 16 cwt. Under the cast bases, which are 3 ft. 6 in. square, are five 15-in. joists, each 80 lbs. per foot, and five 20-in. joists, 80 lbs. per foot, under the cast bases, supporting the light and heavy loads respectively. Underneath these, at right angles, are fourteen 12-in. joists, 17 ft. 6 in. long, resting upon the concrete foundation. In determining the sizes of the joists in any layer, care must be taken to leave sufficient clearance between the flanges to admit the concrete, which must be rammed in place. Hitherto this class of foundation has been but little used in this country, although it has been used in several isolated cases. In Messrs. Jones & Higgins's warehouse, Peckham, it was very successfully used. A modification of the systems lends itself readily as foundation for columns, stanchions, and piers for buildings, or corner sites, or where the site of the building is of such a nature as necessitates the system being used. It has been used in the construction of the new premises in the Strand, at the corner of Adam-street. In this instance the joists are framed 3 in. or 4 in. wide, and rest upon the solid concrete foundation, substituting the usual piers and footings for the front walls."

[Owing to the great pressure of other matter, we are compelled to hold over the remainder of Mr. Cunnington's paper, together with a report of the discussion which followed, until next week.]

THE INSTITUTE OF BUILDERS (INCORPORATED).

THE fourteenth annual general meeting of this Institute was held at the offices, 31, Bedford-street, Strand, W.C., on the 28th ultimo, Mr. William Shepherd in the chair.

The Secretary, Mr. R. S. Henshaw, having read the audited accounts for the past year, they were received and adopted.

The following report, having been read, was unanimously adopted:—

"In presenting their fourteenth annual report, the Council have to record, with great regret, the death of Mr. W. J. Mitchell, of Dulwich, and Mr. R. S. Parker, of London. The Council had correspondence with the London Chamber of Commerce in reference to an inquiry the latter body were prosecuting in reference to an alleged custom of secret trade commissions, and were invited to tender evidence; but, after due consideration, they came to the conclusion that they could not usefully assist in the objects of the inquiry, which were by no means free from obscurity, and the meaning of the term was also indefinite, and the London Chamber of Commerce was so informed. The Workmen's Compensation Act occupied the attention of the Council, and every effort was made by the sub-committee appointed to deal with the subject to obtain such modifications of the measure as were considered consistent with the interests of the trade, but unfortunately with very little effect. Some modifications of the most objectionable provisions, which were in the original proposals, were effected and were satisfactory so far, but the measure remains inequitable on an important point, in that it relieves the workman from any sense of individual responsibility by sweeping away the penalty which should naturally be the consequence of the individual's neglect or inattention to his own personal safety. It is unnecessary to refer in detail to the work of the Committee, which is fully recorded in the minutes. . . The Council have been in correspondence with the London County Council upon the form of contract adopted by that body, and some modifications of the objectionable provisions have been obtained, but the provisions on the whole are still such as to leave it an inequitable contract, and one that contractors should not accept. There appears to be some friction in regard to contracts generally, owing, in a great measure, to the Royal Institute of British Architects being unable to conclude an agreement upon conditions of contract with the Council of the Institute, and there is no doubt it is desirable, and to the interests of all parties, that the two bodies should by mutual concessions make some effort to get rid of the points of difference, and be able to put forward a set of conditions which are agreed. At present there are many very objectionable forms of contract in use by architects, more objectionable in some instances than that of the Royal Institute of British Architects, and there is a difficulty in getting rid of these, which would be simplified if there was a form which could be put forward on the authority of the Royal Institute of British Architects and of the Institute of Builders. The arrangement that was concluded with the Office of Works as to the nomination by the Council of Surveyors in the preparation of the quantities for works under the Department, estimated to cost over 20,000*l.*, has been acted upon in two instances during the year, and the Council has appointed in the cases of a post-office at Swansea and additions to the Parcel Department, Mount Pleasant. The only other matter to which it is necessary to refer is the legislation proposed by the London County Council for amending the London Building Act of 1894, but your Council are not in a position to say if it will be necessary to take action in regard to it, but apparently the interests of the trade do not appear to be directly affected. . . . In accordance with the articles of association, the President, Mr. Wm. Shepherd, one of the Vice-Presidents, Mr. Joseph Randall, the treasurer, Mr. George Plucknett, one of the auditors, Mr. Ernest S. Rider, and four members of the Council, Messrs. George Burt, Henry Gough, S. Wheeler, and George Williams retire, but are eligible for re-election; and one other vacancy on the Council remains to be

filled by the election of some member at the general meeting."

Mr. Henry Holloway was then elected President for the ensuing year, Mr. Joseph Randall and Mr. W. F. King were re-elected and elected Vice-Presidents respectively, Mr. George Burt was re-elected a member of the Council, and Messrs. H. W. Horner, John Greenwood (London), J. Stevenson Jones (Liverpool), and Henry Wells (Aldershot) were elected members of the Council. Mr. George Plucknett was re-elected treasurer of the Institute; and Mr. E. S. Rider was re-elected auditor.

A cordial vote of thanks to Mr. W. Shepherd for his services as President during the past year terminated the proceedings.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of this Council was held on Tuesday in the County Hall, Spring-gardens, Mr. T. McKinnon Wood, Chairman, presiding.

Loans.—Upon the recommendation of the Finance Committee it was agreed to lend the Fulham Vestry 2,500*l.* for wood-paving works; the Greenwich District Board 930*l.* for street improvements; the Hammersmith Vestry 9,820*l.* for erecting a coroner's court and mortuary, &c.; the Lambeth Vestry 1,400*l.* for paving works; the St. Martin's Vestry 1,705*l.* for drainage works; the Wandsworth District Board 3,000*l.* for street improvements; the Camberwell Guardians 770*l.* for building works; the St. George's (Hanover-square) Union 4,500*l.* for the purchase of premises as a site for a laundry; and the managers of the Central London Sick Asylum District 20,000*l.* for the erection of an asylum.

Boadicea Statue.—The General Purposes Committee recommended the Council to approve as a suitable site for the Boadicea statuary group the extreme end of the Victoria Embankment wall by the corner of Westminster Bridge, and that the Highways Committee be authorised to make arrangements for placing the group in position.

Sir Arthur Arnold moved as an amendment, and Mr. Corbett seconded, "That the consideration of the report be postponed for three weeks, and that in the meantime letters be addressed to the President of the Royal Academy, the Royal Institute of British Architects, and the First Commissioner of Public Works, asking them whether they have any alternative site to suggest for the erection of this statue."

The amendment was rejected.

Mr. Bruce moved another amendment—"That the recommendation be referred back in order that the opinion of the President of the Royal Academy may be taken on the subject." It was clear that among sculptors there was a strong opinion that the group, if erected on the proposed site, would be very severely criticised by foreign artists who came to London. He asked the Council to hesitate in fixing the site until they had had the best artistic opinion on the subject.

Mr. Campbell, in seconding the amendment, hoped the new Council would not inaugurate its work by making itself ridiculous in the eyes of the public. He protested against this proposal to give the very best site in the world to this second-rate piece of art. The proper place for this group was in the middle of one of the public parks, but where it was suggested it would add to the vulgarisation of Westminster Bridge.

Mr. J. Burns, M.P., supported the recommendation, and, in doing so, stated that when the opinion of the Royal Academy had been taken in the selection of sites, the result had been anything but satisfactory. A striking instance of this was the Shaftesbury fountain in Piccadilly-circus, which was a beautiful statue, but the site was an inappropriate one, and the chances were, if the Academy were called in to select a site for the Boadicea group, they would make a similar mistake. Public opinion was agreed that the statue was a beautiful one, and surely it was worthy of a good site.

Mr. Beachcroft read a letter from Sir W. Richmond, in which he spoke very highly of the statue.

Mr. Bull thought it rather late to find fault with the statue. The matter had been before them for two years, and they were now ready to bring the statue on to the site. A great many people had written to him approving of the site. In bronze the statue looked twice or three times as well as the plaster cast now on the site.

On a division the amendment was rejected by 78 to 36 votes, and the recommendation of the Committee was then agreed to.

Electric Light Installation, Crossness Outfall.—On the recommendation of the Main Drainage Committee, it was agreed—(*a*) That the estimate of 5,500*l.* submitted by the Finance Committee be approved, and that the Council do agree to the installation of electric light at the Crosness outfall in accordance with the drawings presented to the Main Drainage Committee, at an estimated cosf of 7,000*l.* (*b*) That tenders be invited for the supply and fixing complete of the dynamos, engines, switchboard, and principal mains, and also for the supply and fixing of the service mains, wiring, and fittings.

Central Store and Bakehouse, Boundary-street Scheme.—On the recommendation of the Housing of the Working Classes Committee, it was agreed that the estimate of 1,125*l.* submitted by the Finance Committee in respect of the erection of a central workshop and bakehouse on the Boundary-street area be approved; that the work of erecting the central workshop and bakehouse be carried out by the Council without the intervention of a contractor, and that the plans, specification, quantities, and estimate of 1,016*l.* be referred to the Manager of Works for that purpose.

The Westminster Improvement.—On the report of the Improvements Committee with regard to the Embankment Extension Scheme, it was moved by Mr. H. P. Harris, Deputy Chairman of the Council, seconded by Mr. Hayter, and agreed to without discussion, "That it be referred to the Improvements Committee to prepare and bring up at the earliest date practicable a scheme for the embankment of the Thames from the Victoria Tower Garden to Lambeth Bridge, including the widening of Millbank-street, and the utilisation of any surplus land which remains after the carrying out of the improvement."

The Works Department.—The Main Drainage Committee reported as follows:—

"On February 22 we informed the Council that Mr. Thomas Adams, whose tender, amounting to 2,145*l.* 11s. 3d., had previously been accepted for constructing a new sewer along Hamilton-road, Norwood, declined to undertake the work, and we recommended the acceptance of the next lowest tender, viz., that of Messrs. John Mowlem & Co., amounting to 2,504*l.* 5s. 6d. The Council, however, directed that we should report whether the work should not be carried out without the intervention of a contractor, and empowered us in the meantime to proceed in the matter. Having been informed that the Manager of Works estimated the cost of constructing the sewer at 2,460*l.*, and that he was still prepared to undertake the work at that sum, we thought that we should be carrying out the wishes of the Council by entrusting the job to the Works Department, as the amount of the Manager's estimate is less than that of the tender recommended for acceptance. We have accordingly referred the plans, specification, and bill of quantities, together with the estimate of 2,460*l.*, to the Manager of Works with a view to the work being put in hand without further delay."

Colonel Rotton, on the reception of the report, protested against placing the work in the hands of the Works Department. It was understood that this description of work should be done by contract. This kind of thing would prevent people from contracting, and if no contractors came forward the ratepayers would be at the mercy of the Works Department, which could charge what it pleased.

Mr. Ward said that this matter came up before the last Council. Originally five contractors tendered, but the two lowest afterwards withdrew. Then the Committee advised the acceptance of the third lowest, that of Messrs. Mowlem & Co., but the Council referred it back to see if the Works Department would undertake the work at less cost. Now the case was somewhat altered, as no contractor was willing to undertake the work except at a large advance on the Engineer's estimate.

The report was then accepted.

Houses let in Lodgings.—The Public Health Committee reported as follows:—

"On October 19 last we submitted to the Council the remarks of the Vestry of Clerkenwell on a report by Dr. Young with regard to the sanitary condition and administration of the parish. One of the matters referred to was the desirableness of requiring in the by-laws as to houses let in lodgings, a minimum cubic space of 400 ft. per adult person, in rooms occupied by day and by night, instead of 350 ft., which is the amount specified in the Vestry's by-laws, and we expressed the hope that the matter would be further considered by the Vestry when any amendment of the by-laws was under consideration. We are now glad to report that the Vestry have decided to alter their by-laws so as to increase the air space to 400 cubic feet, and thus to make them in this respect uniform with the by-laws of the other London sanitary authorities."

Waterloo Bridge: Electric Lighting.—The Bridges Committee recommended, and it was agreed, that the design submitted for the lamps to be erected on Waterloo Bridge be approved; that the Bridges Committee be authorised to obtain tenders for the supply of the same, and that the sanction of the Council be given to an expenditure of 300*l.* to be incurred in connexion with supplying and fixing the lamps.

New Offices and County Hall.—The Establishment Committee recommended that the Council should, in consequence of inadequate office accommodation, take on lease No. 55, Charing Cross, at 600*l.* a year rent.

Sir Arthur Arnold pointed out that the Council were spending 15,000*l.* a year for office accommodation, and this matter was of grave and prime importance.

Mr. Beachcroft asked the new Deputy-Chairman (Mr. H. P. Harris) whether he had made a tour of inspection of the offices used by the 400 officials of the Council, and whether he had noticed the insanitary and cramped condition of the rooms where electric or gas light was required throughout the day.

Sir Harry Poland complained that on occasions when he came to Spring-gardens to consult others on important business he had been unable to find a room vacant, and even the passages were often used by members for want of accommodation. It was a great scandal that those in their employment had not proper accommodation, and were relegated to underground places with artificial light in the day time.

Mr. Torrance pointed out that there was a report in existence, and he would ask the Deputy-Chairman to bring it again before the Council.

The Deputy Chairman, in reply, said that he had made a tour of inspection, and he must admit that, but for the guidance of some of the officials, he could not have found his way about. He could only say that the Establishment Committee would take the matter into its serious consideration.

Fire Inquests.—Colonel Ford moved that it be referred to the General Purposes Committee to consider and report as to the desirableness of the provisions of the City of London Fire Inquests Act, 1888 (51 and 52 Vic., cap. 38), being extended to the whole of the County of London.

Mr. Beachcroft seconded the motion, pointing out that the late inquiry into the City fire had been of the greatest assistance.

The motion was agreed to.

Lambeth Palace Grounds.—Colonel Ford moved that the Parks Committee should report as to the expediency of the Council applying to Parliament for power to acquire the grounds of Lambeth Palace as a public open space.

Mr. Dickinson objected to the motion as it stood, and moved, as an amendment, that it be referred to the Committee to consider the advisability and possibility of obtaining the ground as an open space.

Mr. Hayter seconded the amendment, which Colonel Ford accepted, and the motion was then adopted.

The Closing of Cemeteries.—Mr. Shaw Lefevre moved:—"That a Special Committee be appointed to inquire into the condition of the cemeteries and burial grounds within the Metropolitan area, and to report whether any further provision for such purpose is necessary, and also whether it is expedient that any regulation should be laid down in respect of such places in the interest of public health and decency."

Sir Arthur Arnold seconded the motion.

Mr. Leon moved, and Mr. Organ seconded, as an amendment, that the matter be referred to the Public Health Committee.

The amendment was carried, and adopted as a substantive motion.

The Crystal Palace.—Colonel Campbell moved—"That it be referred to the Technical Education Board to consider the suitability of the Crystal Palace as a centre for technical instruction, and to ascertain the terms on which the use of certain parts of the building and grounds could be acquired for such a purpose."

Mr. Dickinson seconded the motion, considering that the ultimate destination of the Crystal Palace would become more pressing year by year.

After discussion, the motion was carried by 44 to 42 votes.

The Council adjourned at seven o'clock.

BUILDING TRADES ASSOCIATION OF MANCHESTER, SALFORD, AND DISTRICT.

THE annual general meeting of the general trades federated in this Association was held at the Albion Hotel, Piccadilly, on Monday evening the 21st ult., Mr. George Macfarlane, Vice-President, in the absence of Councillor W. Holland, J.P., President, occupying the chair. After reading the annual report, which was adopted, the President, Vice-President, Treasurer, and Council were unanimously re-elected.

The Chairman, in his address, stated that the final arrangements had been made and officers elected in connexion with a federation of building trade employers for Lancashire and Cheshire. This combination of building trade employers embraced along with Manchester and Liverpool twenty-four of the largest towns in Lancashire and also some of the towns in Cheshire. The purpose of the federation was to unite all the local associations connected with the building trade throughout Lancashire and Cheshire, and promote and form builders' associations in towns and districts where they did not already exist. This plan of federating local associations with a county federation was part of a national scheme whereby all England and Wales is first apportioned or divided into county districts, then into national association centres. A map had been prepared showing fourteen county divisions—these again are combined into five national centres—the National Association of Master Builders of Great Britain being the head, uniting all and giving guidance and assistance wherever required. Thus every town and every group of villages would have a Masters' Association dealing with matters immediately connected with their own locality. The county division would deal with wider and more important issues, while the National Centre would focus the power of all the constituent Associations; the National Association being, as it were, the hand that held the reins and through whom all were represented. By this scheme a truly National Association would be formed that would have strength and weight to deal with any matters affecting the building trades. The late engineers' strike had been an object lesson both to the workmen and masters. Its result would no doubt have a steadying effect upon trades-unions throughout the country, and might be the means of producing a less combative state of mind and a desire to use diplomacy in settling trade matters. They had difficulties before them in two of the building trades. The carpenters and joiners had given notice for alterations to their working rules, which, if adopted, would seriously affect employers. It was hoped, however, that no conflict would result, and that some mutual concessions would overcome the present difference. The stonemasons had also sent in a notice for another 1d. per hour, and rather drastic alterations to their working rules. Of course, workmen and employers looked at the conditions of labour each from their own point of view; and from an employer's point of view he considered, if such stringent working rules as the masons now wished to enforce were adopted by all the other trades in the country, England would in a few years become a third rate power, and such a thing as "Free Trade" would be unknown. It was a mistaken self-interest in workmen to make such demands. Economic laws could not be overridden with impunity, and it was to be hoped that the masons would let wise counsels prevail, and be content to take a good deal less than they asked for. The limitation of apprentices question was a very serious one, producing a marked scarcity of workmen in the trades affected. All those unfair obstructions, when carried to their logical conclusion, meant a great deal of harm to the country at large, and more especially to the families of the working classes. The Employers' Liability Act that would come into operation on July 1 next would impose a serious burden upon employers in the building trade, and unless the insurance companies were able to give reasonable terms of insurance, small masters would not be able to bear the charges which the law would demand. In many branches of the building trade the difference in social position between employer and employed was not far removed, and often enough the employed had the best of the bargain; at all events, they were burdened with less responsibility, and this new law had imposed an additional responsibility that would bear very hardly upon a class of hard-working and industrious men.

Mr Walter Marshall, stone-mason, in addressing the meeting, read the proposed new rules of the Manchester masons, commenting very strongly upon the unreasonableness of them, and the impossibility of carrying out work either successfully or profitably under the restrictions that the men were trying to impose.

Mr. W. Higson, jun., plasterer and painter, spoke of the great scarcity of plasterers, and the great difficulty on that account of getting work carried on properly; this scarcity being brought about entirely through the limitation of the number of apprentices allowed. They were only allowed three apprentices to each firm, however large a number of men the firm employed, the master plasterers being worse off in the matter of apprentices than any other section of the building trade.

Mr. Henry Matthews, builder, spoke of the advantages likely to be gained by employers from the federation of employers just formed for Lancashire and Cheshire. The Lancashire Federation had been the pioneer of the other federations that were now being formed all over England, and Mr. Tomlison, who had been appointed the secretary of the Lancashire and Cheshire Federation, had done good work in getting the master builders in the various towns of Lancashire together and forming associations where none already existed.

Mr. Frank Williams, plumber, Mr. Amos Mason, plasterer, and Mr. J. Daniels, builder, also spoke upon the importance of getting the various members of each trade to join their several associations.

The necessity of having a Builders' Institute, or Building Trade Exchange, was raised by some of the members, and the secretary, Mr. Fred Scott, was asked to communicate with those who, in other towns, had already formed such Institutions, for information as to their constitution and working.

APPLICATIONS UNDER THE 1894 LONDON BUILDING ACT.

AT the meeting of the London County Council on Tuesday the Building Act Committee brought up the following list of applications under the 1894 London Building Act. Those applications to which consent has been given are granted on certain conditions.*

Lines of Frontage.

Battersea.—A one-story shop in front of No. 94, Eversleigh-road (Mr. H. B. Measures for the Artisans', Labourers', and General Dwellings Company, Limited).—Consent.

Hackney, South.—Buildings on the south side of Lea Bridge-road, eastward of Thistlewaite-road (Messrs. F. Chambers & Son for Messrs. Longbourne, Stevens, & Powell).—Consent.

Lewisham.—One-story additions to the "Chandos Arms" public-house, Brockley-rise, at the corner of Codrington Hill (Mr. R. A. Lewcock for Mr. G. Burrell).—Consent.

Limehouse.—Two open iron galleries at the third floor level, in front of warehouses at Middleton's Wharf, High-street, Wapping (Mr. H. Lafone for Butler's Wharf, Limited).—Consent.

Chelsea.†—Inclosed porches, bay windows, and angle turrets to two blocks of residential flats on the north-east side of Franklin's-row, between Turk's-row and the grounds of the Duke of York's School (Mr. P. Hoffmann for Mr. H. Bailey).—Consent.

Chelsea.—Projecting bay windows and porches at Nos. 2 and 4, Lower Sloane-street (Mr. W. H. Willett).—Consent.

Fulham.—A porch to each of three blocks of residential flats in course of erection on the west side of Rostrevor-road, between Swift-street and Filmer-road (Mr. J. A. Bowden for Messrs. Evans & Read).—Consent.

Fulham.—An addition to Fulham Town Hall on the site of Nos. 1, 3, 5, 7, and 9, Harwood-road (Vestry of Fulham).—Consent.

Hammersmith.—A glass and iron shelter in front of Hammersmith Town Hall, Brook Green-road (Mr. J. H. Richardson for the Vestry of Hammersmith).—Consent.

Hampstead.—Two bay windows and an open wooden porch in front of a house next Beechroyd, on the north side of Finchley-road (Messrs. Davis & Emanuel for Mr. E. J. Cave).—Consent.

Holborn.—A porch in front of a proposed new building on the site of Nos. 17, 18, and 19, Queen-square, Bloomsbury (Messrs. Marshall & Vickers for the Alexandra Hospital for Children with Hip Disease).—Consent.

Islington, East.—A one-story shop upon part of the forecourt of No. 214, Seven Sisters'-road (Mr. C. Catling).—Consent.

Lambeth, North.—One-story shops in front of Nos. 133, 135, 137, 139, 141, and 143, Waterloo-road (Mr. P. H. Clarke for Dr. E. Croker).—Consent.

Newington, West.—That the application of Mr. J. Warne, for Mr. J. H. Billinghurst, for an extension of the period within which the erection of seventeen houses on the south side of Hillingdon-street, between No. 133 and Royal-road, Walworth, was required to be completed, be granted.—Agreed.

St. George, Hanover-square.—A portico to a block of residential flats on the north side of Brook-street, at the corner of South Molton-lane (Messrs. Holloway Bros.).—Consent.

Wandsworth.—That the Council do approve of the variation shown on the plans submitted with the further application of Mr. H. Branch for the Wandsworth Library Commissioners from the plans sanctioned on December 20, 1897, for the erection of a one-story library building on the north side of Allfarthing-lane, at the corner of Melody-road.—Agreed.

Westminster.—An open portico in front of a block of residential flats on the north-east side of Carlisle-place, Victoria-street (Mr. G. Baines for Mr. G. Martin).—Consent.

Westminster.—One-story shops on the forecourts of Nos. 96, 96A, 96B, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, and 122, Victoria-street (Mr. C. Fruen).—Consent.

Strand.†—That Mr. J. Dunn be informed that the application of Mr. W. Horrex for consent to a glass and iron covered way erected in front of Horrex's Hotel, Norfolk-street, having been further considered, the Council sees no reason to vary its decision of November 30 last.—Agreed.

Kensington, South.†—A glass and iron covered way erected at the principal entrance to the De Vere Hotel, Hyde Park Gate (Mr. W. Graves for Mr. J. Crowle).—Refused.

Bethnal Green, North-east.†—Erection of a glass and iron illuminated facia in front of the shops at Nos. 48 and 50, Green-street (Mr. J. G. Needham for Mr. A. Gobetz).—Refused.

Dulwich.†—Six houses with projecting bay windows on the north side of Crawthew-grove, with the flank of the westernmost house to abut upon Worlingham-road, Camberwell (Mr. A. E. Mullins for Mr. L. Notley).—Refused.

Clapham.—One-story addition and the raising of the present addition at the rear of No. 88, Bolingbroke-grove, abutting upon Wakehurst-road, Battersea (Mr. H. Branch for Dr. T. Clarke).—Refused.

Fulham.†—A building with a one-story projecting bay window and porch at No. 109, New King's-road (Mr. J. B. Rosevear).—Refused.

Hampstead.—Houses, with shops, on the north-east side of High-road, Kilburn, to abut also upon the west side of Kilburn Priory (Mr. A. O. Collard for Captain J. Fitzroy Bagot, M.P., and Mr. A. Chudleigh).—Refused.

Kensington, South.—A block of buildings with projecting bay windows, &c., at Hyde Park Gate, on the south side of Kensington-road, to abut also upon Palace Gate (Mr. B. Hosegood).—Refused.

Lewisham.†—The erection of houses, with shops, upon the site of Nos. 141 and 143, Rushey Green (Mr. A. L. Guy for Mrs. Atkins).—Refused.

Marylebone, East.—The erection of an electricity generating station on the north-east side of Grove-road, St. John's Wood, to abut also upon North Bank (Mr. C. S. Peach for the Central Electric Supply Company, Limited).—Refused.

Marylebone, West.†—The erection of a porch on the south side of the "Crown" public-house, Nos. 23 and 24, Aberdeen-place, St. John's Wood (Mr. C. H. Worley for Mr. F. Crocker).—Refused.

Marylebone, West.†—An open porch in front of Bendall House, Great James-street (Mr. A. J. Bolton for Sir T. Baker, Bart.).—Refused.

Paddington, South.—The erection of a glass and iron conservatory upon the one-story hall and portico at No. 5, Connaught-place, Bayswater (Mr. E. S. Prior for Mr. J. M. Scott).—Refused.

Rotherhithe.—A theatre on the west side of Lower-road, to abut also upon Culling-road (Mr. G. R. Sprague for Messrs. Marler & Saunders).—Refused.

St. George, Hanover-square.†—Enclosure of the sides and front of the portico at No. 47, Brook-street (Messrs. G. Trollope & Sons for Lady Delamere).—Refused.

St. George, Hanover-square.†—The erection of a glass and iron pent at the entrance to No. 32, Brook-street, to abut upon South Molton-street (Mr. T. J. Gawthorp for Messrs. Thomas & Son).—Refused.

St. George, Hanover-square.†—Wood and glass inclosures of two verandahs erected at No. 28, Park-lane, and overhanging the public way in that street and Upper-street respectively (Messrs. S. J. Waring & Sons for Mr. S. J. Waring).—Refused.

St. George, Hanover-square.†—The erection of a glass and iron pent at the Dover-street entrance to the Avondale Hotel, No. 68A, Piccadilly (Messrs. Douglas Young & Co. for the Avondale Hotel Company).—Refused.

Wandsworth.†—A one-story shop on part of the forecourt of No. 135, Eardley-road, Streatham (Mr. T. G. Stanley).—Refused.

Westminster.†—Buildings on the northern side of James-street, and also on the southern side of Caxton-street, to abut upon Brewers-green (the Vestry of St. Margaret and St. John, Westminster).—Refused.

Width of Way.

Camberwell, North.—A building over the gateway entrance to No. 176, Neate-street (Mr. A. Garnar for Mr. E. G. Quinn).—Consent.

Hackney, South.—A boundary wall on land adjoining the Great Eastern Railway, on the east side of Warburton-street (Mr. S. A. Bevan for Gas Light and Coke Company).—Consent.

Southwark, West.—Additions to the Board School, Marlborough-street, New-cut (Mr. T. J. Bailey for the School Board for London).—Consent.

Woolwich.—The forecourt walls of four houses on the north-east side of Elm-grove, Plumstead, at less than the prescribed distance from the centre of the road (Mr. T. Hastings).—Consent.

Norwood.—The erection of five blocks of two-

* Names of applicants are given in brackets. Buildings are new erections unless otherwise stated.

story stables on a site at the rear of the houses on the north side of Harpenden-street, Norwood-road, Tulse Hill, at less than the prescribed distance from the centre of a passage-way leading out of Harpenden-street (Mr. H. G. Brace for Mr. W. Moss).—Refused.

Whitechapel.—A house, with shop, on the north side of Pelham-street, Mile End New Town, with the flank wall at less than the prescribed distance from the centre of Hunt-street (Messrs. Davis Brothers).—Refused.

Space at Rear.

Southwark, West.—Three blocks of stabling, with bacon, &c., stores over, on the site of Nos. 85 to 103 (odd numbers only), Gravel-lane, and premises at the rear at the corner of Orange-street, without an open space at the rear of such blocks (Mr. E. Carritt for Mr. J. Sainsbury).—Refused.

Irregular Open Space at Rear of Buildings.

Whitechapel.—That the Council do in the exercise of its powers under Section 41 of the London Building Act, 1894, allow a modification of the provisions of that section with regard to open spaces about buildings, so far as relates to the proposed erection of three four-story houses, with shops, on the site of Nos. 80, 82, 84, and 86, Hanbury-street, Spitalfields, with irregular open spaces at the rear (Messrs. Rouch & Parkhouse for Mr. H. Parkhouse).—Agreed.

Deviation from Approved Plans.

Finsbury, Central.—That the application of Mr. R. W. Hobden on behalf of Mr. S. Parrish, for permission to deviate from the plans sanctioned on November 2, 1897, for the rebuilding of the "Sutton Arms" public-house, No. 16, Great Sutton-street, by an alteration in the position of the staircase leading from the first floor to the private rooms on the upper floors of the premises and a reduction in the size of the internal area on the west side of the public-house be not granted.—Agreed.

Line of Fronts and Width of Way.

Fulham.—Porches, with balconies over, to four two-story houses on the north-west side of Colehill-lane, between Kimbell-gardens and Frith-road (Mr. H. Mann).—Consent.

Kensington.†—A block of residential flats, with bay windows, on the site of Nos. 79, 81, 83, 85, and 87, Drayton-gardens (Mr. A. Blackford for Mr. J. H. Duncan).—Consent.

Kensington, South.—Iron and stone balconettes, and of a glass and iron pent roof, to a block of residential chambers on the site of No. 59, Drayton-gardens (Mr. J. Norton for Mr. T. Boyce).—Consent.

Battersea.—That no order be made with respect to the application of Mr. J. G. Buckle for Mr. T. Jones, for the consent of the Council to the erection of a one-story building at the rear of No. 100, Lavender Hill, to abut upon Tipthorpe-road.—Agreed.

Brixton.—That Mr. H. A. Scott be informed that the application of Mr. F. Harmer for the consent of the Council to the erection of a one-story addition upon the forecourt of a workshop next No. 1, Station-road, having been further considered, the Council sees no reason to depart from its previous decision not to grant the application.—Agreed.

Hammersmith.†—Rebuilding of the White Hart public-house, Nos. 357 and 359, King-street West, to abut upon White Hart-court (Messrs. Wylson & Long).—Refused.

Kensington, South.—A one-story shop on part of the forecourt of Jasper House, Earl's Court-road, (Messrs. Morley & Letts, for Mr. J. Buckle).—Refused.

Peckham.—That Mr. E. J. Strevens be informed that his application on behalf of Mr. T. Wade, for the consent of the Council to the erection of one-story shops in front of Nos. 571 and 573, Old Kent-road, Camberwell, having been further considered, the Council has resolved to adhere to the decision of February 28 last with reference to the application.—Agreed.

Line of Fronts and Space at Rear.

Wandsworth.—That the Council, in the exercise of its powers under Sections 22 and 41 of the London Building Act, 1894, do not consent to or permit the erection of a two-story building on the north side of the Balham Hotel, No. 21, Chestnut-grove, Balham, at the corner of Boundaries-road (Mr. H. F. Williams for Mr. G. R. Huntley).—Agreed.

Thickness of Walls, &c.

Stepney.—That the Council, in the exercise of its powers under the London Building Act, 1894, do not approve of a variation from the plans and particulars sanctioned on October 26, 1897, for the rebuilding of a foreman's dwelling-house in the cooperage on the south side of Raven-row, to abut also upon Russell-street, Whitechapel-road (Mr. R. Spence for Messrs. Mann, Crossman & Paulin).—Agreed.

Line of Fronts and Construction of Buildings.

Clapham.—That Mr. C. D. Collins be informed that his application for the consent of the Council to the construction and erection of a wood and glass show-case at No. 78, Northcote-road, to flank upon Bennerley-road, Battersea, having been further considered, the Council sees no reason to depart from its previous decision not to grant the application.—Agreed.

Formation of Streets.

Woolwich.—The formation or laying out of a new street, for carriage traffic, between Maurice-street and Green-lane, New Eltham (Mr. G. F. Logsdail for Mr. A. Stubbs.) That the name Blanmerle-road be approved for the new street.—Consent.

Lewisham.—The formation or laying out of two new streets, for carriage traffic, to lead out of Brockley-lane and Brockley-road, respectively (Mr. J. W. Webb.) That the names Crofton Park-road and Stillness-road be approved for the new streets.—Consent.

Wandsworth.†—The formation or laying out of three new streets, for carriage traffic, to lead out of Mitcham-road, and the formation of a street in continuation of a new street known as Totterdown (Mr. W. C. Poole for Mr. A. Heaver.) That the names Undine-street, Valnay-street, Ensham-street, and Totterdown-street, be approved for the new street.—Consent.

Rotherhithe.†—The formation or laying out, for foot traffic only, of a paved street, 20 ft. wide, at the rear of New Church street, Bermondsey, in continuation of Llewellyn-grove (Mr. H. H. Bridgman).—Refused.

Wandsworth.—Houses, with shops, on the north side of Vant-road, and the widening of part of Mitcham-road (Mr. W. C. Poole for Mr. G. Heaver).—Refused.

Whitechapel.—The formation or laying out of a paved street, 30 ft. wide, between Brady-street and a carriageway on the north side of Brady-street dwellings, on a site adjoining Salomon's almshouses and the disused Jews' burial ground next the Great Eastern Railway, one of the entrances to such new street being 40 ft. wide (Mr. H. H. Collins for Messrs. N. & R. Davis).—Refused.

Cubical Extent.

Woolwich.—That subject to the provisions of Section 76 of the London Building Act, 1894, the consent of the Council be given to the erection, on a site approached from roads out of Footscray-road, New Eltham, of a building to exceed in extent 250,000 but not 450,000 cubic feet, and to be used only for the purposes of the trade of a lithographic printer (Messrs. F. Chambers & Son for Messrs. Gilbert, Whitehead, & Co.).—Agreed.

Extension above Diagonal Line.

Chelsea.—A modification of so much of the provisions of Part V. of the London Building Act, 1894, with regard to the extension above the diagonal line as directed to be drawn by Section 41 of that Act, so far as relates to the height of a portion of the rear of a block of residential flats, six stories high, proposed to be erected on the site of Nos. 12 and 13 and of part of Nos. 11 and 14, D'Oyley-street (Messrs. Bourchier & Galsworthy for Messrs. W. Holt & Sons).—Refused.

Buildings for the Supply of Electricity.

Hammersmith.—An addition to the Hammersmith electric lighting station, Palace-road, Fulham (the Vestry of Hammersmith).—Consent.

Conversion of Buildings.

Kensington, South.—Alterations to Jasper House No. 1, Wetherby-terrace, Earl's Court-road, and the conversion of that building into a shop (Messrs. J. W. Morley & Letts for Mr. J. Buckle).—Refused.

Recommendations marked † are contrary to the view of the Local Authority.

Correspondence.

To the Editor of THE BUILDER.

DESIGN FOR A SMALL COUNTRY CHURCH.

SIR,—Whatever merits this design, illustrated last week, may possess, there are two practical objections to the erection of such a structure. Firstly, there would be the usual danger from fire common to all wooden buildings, or buildings in which wood predominates; and, secondly, there would, after a few years, be a continual expense for repairing decayed woodwork and for painting. Surely a simple Early English design is most suitable for a small country church.—Yours, &c.,

PRACTICAL.

*** The drawing was a competition one for the Grissell Medal given by the Institute of Architects, and we understand that the condition was that it was to be mainly a timber building, in order to exhibit construction in wood. We do not see such strong objection, however, to a timber church for a country district. The danger of fire in a church is much less than in most other classes of building.—ED.

METHODS OF LAYING SLATES.

SIR,—I notice in your issue of the 26th ult. you illustrate what is called "A new method of laying slates." This, so far as France is concerned, is not by any means new. I send you herewith a set of Messrs. G. Larivière & Company's illustrated books, numbered 1, 2, 3, 4, 5, and 6. In No. 3, on page 6, you will see the same thing illustrated, only the slates are held in position by iron bolts on an iron roof. Of course, the principle is exactly the same as that shown by you. There is also a somewhat similar method of roofing shown in album 4, page 38. In the latter case ordinary slates are laid on the skew, but there is no lap shown, nor is any necessary when the slates are laid in this way. It is obvious, however, that the skew-laid roof must be more liable to let the wet in than the roof shown on page 6 of album 3.

C. H. BROODBANK.

*** The first example referred to in Messrs. Larivière's catalogue is not exactly the same in detail as the Dublin Slating Company's, as the top angle of the slate is left uncut; it is, as our correspondent says, the same in principle.—ED.

BOOKS RECEIVED.

AMERICAN INSTITUTE OF ARCHITECTS.—Proceedings of the thirty-first annual Convention (Published by the Board of Directors of the Institute).

LAW AND PRACTICE RELATING TO WORKMEN'S COMPENSATION AND EMPLOYERS' LIABILITY.—By W. Ellis Hill (Waterlow & Sons).

The Student's Column.

THE CALCULATION OF STRENGTH OF MATERIALS AND RESISTANCES.—XIV.

A BRANCH of our subject which has been recently introduced into the Intermediate Examination is the reciprocal diagram of forces. To understand this it is necessary that the student should first be familiar with the triangle, parallelogram and polygon of forces. We shall therefore invite the student's attention to so much of the study of statics as relates to these theorems.

The first axiom which must be comprehended is that forces may be represented in magnitude and direction by straight lines. Since lines may be drawn from any point, it is clear that they may be so drawn as to represent the points of application of forces; and, since they may be drawn in any direction, they may likewise be made to represent the direction of forces. As also lines may be drawn of any length, they may be made of such length as to represent on any desired scale in relation to each other the same ratio that forces do; that is, they may, by their length, represent the magnitude of the forces.

When two forces act on a point in the same direction their combined effort is equal to their sum, for their sum may be represented by a straight line, the length of which is made up of two straight lines, whose lengths respectively represent the two forces. Similarly, when two forces act on a point in opposite directions their combined effort will be the difference of the two forces in the direction of the greater.

When single forces acting upon the points produce the same effect as two or more forces acting upon the same point, the first force is called the resultant of the other forces. To find the resultant of two forces we make use of the theorem of the parallelogram of forces, which may be thus stated. If two forces acting from the same point be represented in magnitude and direction by two lines meeting at that point, then the resultant of such forces will be represented in magnitude and direction by the diagonal of a parallelogram, of which these lines are the sides; and conversely if the diagonal of a parallelogram represents in magnitude and direction the resultant of two forces, the magnitude and direction of the components is represented by the adjacent sides of the parallelogram.

From these theorems results the principle of the triangle of forces, for it is clear that if the effect produced by any two forces acting on a point is represented in magnitude and direction by the diagonal of a parallelogram, that resultant tends to produce motion in the point in the direction indicated by the diagonal, and with the amount of force represented by its magnitude or length. Now if this point were also acted upon by another force, equal in magnitude to the resultant but opposite in direction, the point would be in equilibrium.

If, therefore, in our original parallelogram we take two of the sides, one after the other, in order, and the diagonal joining those two sides, we have a triangle in which the three forces, that is the two components and their resultant, are now represented in magnitude by the three sides of a triangle. But whereas the direction of the components is still represented by two sides of the triangle, the third side now represents a force equal in magnitude but opposite in direction to their resultant; hence the point would under those conditions be at rest, and so we have the theorem of the triangle of forces thus stated. If three forces acting upon a point be represented in magnitude and direction by the three sides of a triangle taken in order, they will keep it at rest. Conversely if three forces acting upon a point keep it in equilibrium, they may be represented in magnitude and direction by the three sides of a triangle taken in order.

From the triangle of forces it is but one step in advance to the polygon of forces, which may be thus stated :—If any number of forces acting upon a point be represented in magnitude and direction by the sides of a polygon taken in order, they will be in equilibrium; and, similarly, if any number of forces be represented in magnitude and direction by the sides of a polygon taken in order, their resultant will be represented by the line which completes the polygon taken in reverse order.

The principle of the reciprocal diagram of forces is based upon that of the polygon of forces. In the reciprocal diagram each line represents in magnitude and direction a force acting in a truss, whether the truss be simple or complex. As the forces in a truss are in equilibrium, these forces, when represented in a reciprocal diagram, form closed polygons. The application of this system will be best understood by the student if he will follow the working out of some examples, commencing with those of a simple character. The system which we are now studying was first introduced by Professor Clarke-Maxwell, and the method of lettering and working which we shall follow are suggested by Mr. Bow.

The following is Mr. Bow's description of his system of lettering :—"This plan of lettering consists in assigning a particular letter to each enclosed area or space in, and also to each space (enclosed or not) around or bounding the truss, and attaching the same letter to the angle or point of concourse of lines which represents the area in the diagram of forces. Any linear part of the truss or any line of action of an external force applied to it is to be named from the two letters belonging to the two spaces it separates, and the corresponding line in the reciprocal diagram of forces which represents the forces acting in that part or line, will have its extremities defined by the same two letters."

The advantage of Mr. Bow's system of lettering will be most readily seen by working an example. Let us, therefore, suppose that in fig. 1 we have a simple truss, consisting of two principal rafters and a tie.

In the application of the reciprocal diagram of forces we really require two diagrams, one representing the form of the truss, usually called the "frame diagram," the other the diagram of the forces, which is called the "reciprocal diagram of forces," or sometimes the "diagram of forces" or "stress diagram."

Let us suppose that as a simple example we have a truss as shown in diagram, fig. 1, with a concentrated load at the apex of some determinate amount, say 5 tons. The truss being symmetrical and the load central, this is divided equally between the supports, and their reactions are therefore equal and $2\frac{1}{2}$ tons each. Thus we have three known forces, W, R_1, and R_2, whose directions are shown by the arrows. We do not at present know what is the amount of the forces acting in each side of the triangular truss, but we can find out by means of the reciprocal diagram of forces. Our first step is to place a letter to each space bounded by lines that represent the direction of forces. We thus have space A between W and R_1, space B between W and R_2, space C between R_1, and R_2, and space D enclosed by the lines of the truss.

We commence our reciprocal diagram of forces (fig. 2) with our known forces by drawing a vertical line, this being the direction of the force W, and to scale to represent its magnitude of 5 tons; we letter this line A B, the letters of the spaces on either side of its direction in the frame diagram (fig. 1). We know also the magnitude of R_1 and R_2. Taking R_1 first, we know that its line in the reciprocal diagram is A C, and we have already the point A, therefore we draw A C on A B to represent $2\frac{1}{2}$ tons on the same scale as before, similarly B C represents $2\frac{1}{2}$ tons. We complete our reciprocal diagram by drawing from A, a line A D parallel to the side of the truss between the spaces A and D, from B, a line B D parallel

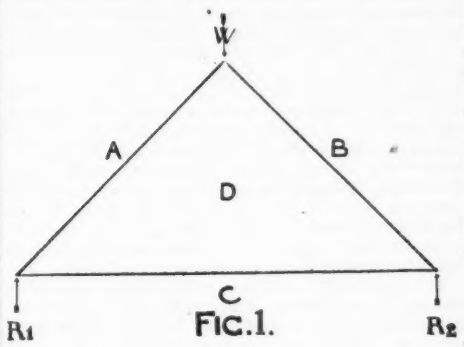


FIG. 1.

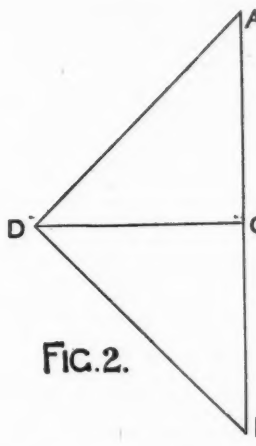


FIG. 2.

to the side of the truss between the spaces B and D, and from C, a line C D parallel to the side between the spaces C and D. Then in our reciprocal diagram the lines A D, C D, and B D represent both the direction and the magnitude of the forces in the sides of the truss to which they are respectively parallel.

GENERAL BUILDING NEWS.

HANWELL PARISH CHURCH.—New chancel and vestries have been erected at this church from the designs of Mr. William Pywell. The original portions of the church were built fifty-seven years ago, from the designs of the late Sir George Gilbert Scott. A chancel was not then provided—the choir occupying the first bay of the nave—and only one vestry was at that time erected, which, however, fell into such a dilapidated condition that fears were entertained for its safety. The only course open was to take the vestry down. The new work comprised the extension of the church eastward by taking out the east end wall and inserting an arch rising from corbel springers to carry the gable above. The three-light lancet window with its painted glass has been refixed at the east end of the added portion. The prayer-desks and choir-stalls have been removed from the nave to the chancel, and advantage has been taken of the space thus afforded for providing additional seating to reseat the whole of the nave. Vestries for clergy and choir have been erected on the north side of the chancel. The work has been carried out by Mr. W. Brown, builder, of Southall. The church stands on the site of the parish church erected in 1782. In the vaults was buried Jonas Hanway, founder of the Marine Society, and a co-founder of the Magdalen Hospital, who died in September, 1786. There is a tablet to his memory, between the memorials to Cobden and Charles Buller, in the north transept of Westminster Abbey. G. H. Glasse, the eminent Greek scholar, and the "E. E. A." of the *Gentleman's Magazine*, was appointed Rector of Hanwell in 1785.

RESTORATION OF SPORLE CHURCH, NORFOLK.—The Parish Church of St. Mary, Sporle, is now closed for the purpose of undergoing a further restoration, the principal works undertaken being a new roof to nave and north chancel aisle, taking off, re-casting, and relaying the old lead, taking down and rebuilding the south nave arcading with clearstory over, and reinstatement of the ruined north chapel and sacristy. Messrs. Cornish & Gaymer, builders, of North Walsham, are executing the work, from designs supplied by Mr. H. Green, architect, of Norwich.

CATHOLIC CHURCH, LISBURN.—A new Catholic church, in the Early English style, is being erected at Lisburn. The contract for the building, which will, when finished, cost over 12,000*l.*, has been intrusted to Messrs. H. Laverty & Sons. The church will be built of white Scrabo stone. The entire area of the building is 140 ft. long by 64 ft. wide, and it is divided into nave and aisles by a colonnade of Scotch stone, with Aberdeen granite introduced. The floor of the body of the church is to be laid with white and black mosaic work, while the sanctuary is finished in glazed encaustic. The tower and spire are designed with the idea of bringing the façade into prominence by projecting the tower clear of the nave. The spire, which will not at present form part of the contract owing to the scarcity of funds, was intended to be built of Armagh limestone, and when finished would have measured 170 ft. from ground to cross. The architects are Messrs. E. & J. Byrne, Dublin.

NEW CHURCH, YARMOUTH.—The Bishop of Norwich has just consecrated a new church, built to meet the increasing needs of the north end of Yarmouth. It takes the place of a small temporary building, and has cost about 1,000*l.* The architects were Messrs. Bottle & Olley, and the builder Mr. Cork, Yarmouth.

METHODIST CHAPEL, BIRMINGHAM. — A new Methodist chapel has just been opened in Ombersley-road. The new building is of red brick, with Bath stone dressings. There will be seating accommodation for 470 people. Two vestries have been provided. The work has been executed by Messrs. G. Webb & Sons, and the architect is Mr. A. H. Goodall, Nottingham. The total cost will be about 2,500*l.*

METHODIST CHAPEL, ARMLEY, YORKSHIRE.—A new Methodist New Connexion Chapel in Hall-lane, Armley, was opened on the 12th ult. The building, which takes the place of an iron structure in Tong-road, adjoins New Wortley Cemetery. The site of chapel and schools covers an area of 925 square yards. The inside of the chapel consists of nave and side aisles. It is 52 ft. long by 39 ft. wide. A deep recess behind the pulpit forms the organ and choir chamber. Over the vestibule is a small end gallery. The pulpit and Communion railings are of English oak. The chapel provides accommodation for 410 persons. The school, situated behind the chapel, consists of a central hall, 52 ft. long by 28 ft. wide, out of which five class-rooms open. The minister's vestry, a caretaker's house, &c., are placed between the chapel and the school. In the basement is a room for cooking. The architect is Mr. W. S. Braithwaite, of Leeds, and the work has been carried out by the following contractors :—Mr. W. Lolley (brick and mason work), Mr. J. Taylor (carpenter and joiner), Messrs. W. & C. Barrand (plumbers and glaziers), Mr. J. D. Dakin (plasterer), Messrs. J. Atkinson & Son (slaters), Messrs. Newsum, Roberts, & Co. (heating), and Mr. H. Smith (painting).

STABLES, NEWINGTON.—New stables have been erected by the Newington Vestry in Manor-place, Walworth. The builders were Messrs. Balaam Bros., and the architect was Mr. Rowland Plumbe.

NEW INFIRMARY, ISLINGTON.—The foundation-stone of the new infirmary, which is to be built on the site of the Small-pox Hospital, Highgate Hill, was laid recently. The building is being erected by Messrs. Kirk & Randall, the architect being Mr. W. Smith.

BUILDING IN ABERDEEN.—At the last meeting of the Plans Committee of the Town Council the aggregate value of the property shown on plans of new buildings approved of was the largest that has ever been dealt with at a single sitting. Included among these was a warehouse near the harbour, with front elevation to Regent Quay. The architect is Mr. A. Marshall Mackenzie, A.R.S.A., Aberdeen, and the estimated cost is 12,000*l.* The chief feature in the building trade is the large number of big tenement houses being built, or just about to be built, in the northern part of the city, and also at Sorry, on the south side of the River Dee. The Borough Surveyor, Mr. W. Dyack, C.E., has issued a report (and plan) of a proposed public slaughter-house at Central Park, Kittybrewster—the site which is likely to be recommended for adoption by the Town Council. He estimates the total cost, inclusive of buildings, roadways, railway sidings, and the purchase of the Northern Agricultural Hall (which is at present fitted inside for the sale and storage of cattle), but exclusive of the ground, at 30,000*l.* In the vicinity of the city, house-building is especially active, in the suburban villages of Cults and Culter, and also in the town of Stonehaven. The Great North Railway Company are to erect their new workshops (in the borough of Inverurie) by contract, and have advertised for tenders for the work.

BATHS AND WASH-HOUSES, NEWINGTON.—The baths and wash-houses which have just been erected by the Newington Vestry, at an outlay of over 40,000*l.*, occupy a site in Manor-place, Walworth. The architects were Messrs. I'Anson & Son, the builders being Messrs. Balaam Bros. The first-class swimming bath for men is 120 ft. long by 40 ft., and is surrounded by a platform and a number of dressing-rooms, with a gallery running all round which will seat nearly a thousand visitors. The second-class swimming bath is of about the same capacity, only a little longer and narrower. The ladies' swimming bath is 60 ft. in length, 30 ft. across. Slipper baths for both sexes are also provided. A bar is provided where swimmers and bathers may obtain refreshment; while there is also a room for the use of the swimming clubs. The wash-houses are removed somewhat from the swimming baths

The swimming baths will be supplied with water from two artesian wells. The establishment will be lighted throughout with electricity.

WORKMEN'S INSTITUTE, MOUNTAIN ASH.—The laying of the foundation-stone of the new Workmen's Institute at Mountain Ash took place recently. The main building of the institute is to be 94 ft. long by 66 ft. wide over walls, and 61 ft. high to eaves. The front elevation will be red moulded bricks and terra cotta work, relieved by ornamental cornices, &c. On the basement floor provision is made for swimming baths of the length of 61 ft. and 26 ft. wide. On the ground floor provision is made for a reading-room, gymnasium, and lecture-rooms, library, &c. The first floor will consist of one room 92 ft. by 62 ft. by 34 ft. high to ceiling, with rising galleries, stage and proscenium arch. This room will provide sitting accommodation for about 2,000 persons. The building throughout will be heated by steam and the electric light will be supplied. The plans have been prepared by Mr. Dan Lloyd, Aberbeeg, Mon. The contract is in the hands of Messrs. C. Jenkins & Sons, Porth.

VICTORIA HALL, RADSTOCK.—A Jubilee Victoria Hall has just been opened at Radstock. The hall stands on the site of the old Workmen's Club and Institute. The space on the ground floor is devoted to a reading-room and library, while another room will be used for billiards and other games. The hall is overhead. The architect was Mr. W. J. Willcox, of Bath, the County Surveyor, and the builder was Mr. Joseph Bird.

HOTEL, PADSTOW, CORNWALL.—A new hotel is to be built at Padstow. The architects are Messrs. Crickmay & Sons, Westminster and Weymouth.

OWENS COLLEGE NEW BUILDINGS, MANCHESTER.—The contract for the foundations of the new buildings of the Victoria University, to be erected under the Whitworth Trust, has been given to Mr. Normanton, of Manchester. The site of the new erection is at the corner of Oxford-road and Burlington-street. To all intents and purposes, says the Manchester *Evening News*, the elevation of the new building, which will be known as the Whitworth Hall, will be a duplication of the existing buildings on the right of the tower on the Oxford-road front, but the purpose is to provide a hall suitable for large University gatherings, for concerts, public meetings, for examinations, banquets, &c. The main building will occupy the extreme south-east portion of the grounds of the College, and will be connected with the existing buildings fronting on Oxford-road and on Burlington-street, and will enclose the quadrangle completely. It will continue the existing block in Oxford-street to the end, the new portion being in its exterior appearance very similar to that on the further side of the tower, while it will be connected with the Christie Library (an illustration of which appeared in the *Builder* of November 14, 1896), by low buildings. The apex line of the roof of the Whitworth Hall is to be practically a continuation of that of the older building, divided from it by the tower, and forming part of the same block. The new building is connected with the tower by an archway which is to form the new carriage entrance. The ground floor will be occupied by small rooms to be utilised for various purposes. Two of them will serve as retiring rooms, when the large hall is used for assemblies, and others will be devoted to the several requirements of University offices, for use in examinations, &c. There is one, too, which is especially intended for use when banquets are held in the large hall. The main hall itself occupies the whole of the first floor, the building having only two floors, while the existing structure on the further side of the tower comprises five stories. As the height of the two portions of the whole building will be practically the same, it follows that the main hall will be the height of the upper three stories of the older portion. The hall is to be entered partly from the grand staircase in the old tower, and by the principal entrances for the public, which will be situated in Burlington-street and Oxford-road. There is a large south window in the end overlooking Burlington-street, and this will be flanked by two towers which contain staircases leading to the hall and to the galleries that are to be erected at this end. There are to be no rooms over the hall, which has a high-pitched open timber roof, and this will be filled with open tracery. Provision is being made for the placing of a large organ at the north end of the hall, and the platform, which is to be arranged to accommodate either orchestra or speakers, is of very large extent. The main hall is 121 ft. long by 50 ft. wide. It measures 56 ft. in height from the floor to the inside of the apex of the roof, and 35 ft. to the wall plate. The seating capacity is calculated at close upon 1,000, including the orchestra. The hall will be lighted on each side by five two-light windows, in addition to the large one at the south end. There are two large entrances to it from the main staircase in the tower and from the College, but the public entrances are at the south end. At this end the floor will slope slightly upwards to give a better view of the platform to those who occupy positions at the further end of the hall. When the scheme is completed it will have cost, it is estimated, about 42,000*l.* The architects are Messrs. A. Waterhouse & Son.

MUNICIPAL BUILDINGS, KINGSTOWN, NEAR DUBLIN.—On the 18th ult., Mr. Charles P. Cotton, Chief Engineering Inspector, Local Government Board, held an inquiry in the Town Hall, Kingstown, with reference to the application of the Township Commissioners for a loan of 6,600*l.* for the purpose of erecting municipal buildings, 1,000*l.* for the purpose of constructing sewers, and 2,000*l.* for the purpose of laying down certain footpaths with granolithic pavement or concrete, and to provide kerbing. Mr. Joseph Berry, C.E., Township Engineer, explained the plans of the proposed new municipal buildings, which include new stables, fire station, stores, and workshops. There was no oppositon.

EYE INFIRMARY, PAISLEY.—The contracts for the new Eye Infirmary, to be erected by Provost Mackenzie as a Jubilee offering, have been let as follows:—Mason work, Morrison & Muir, Glasgow; brickwork, Robert Martin, Paisley; joiner work, Alexander M'Naughton, Paisley; roof tile work, Shaw & Stewart, Paisley; plaster work, D. T. Hutchison, Paisley; plumber work, N. G. Haran & Sons, Paisley; smith work, James Cassels, Paisley. Mr. Charles Davidson, Paisley, is the architect.

PUBLIC BATHS, BOLTON.—The Baths Sub-Committee of the Bolton Sanitary Committee met at the Town Hall recently to inspect plans prepared by Mr. R. K. Freeman, architect, for new public baths adjoining the High-street Library. After due consideration a sketch plan was recommended for adoption, detailed drawings being ordered to be prepared for the purpose of tenders being invited for the carrying out of the work.

RESTORATION AT COCKFIELD HALL, YOXFORD.—The works in the partial rebuilding and enlargement of Cockfield Hall, Yoxford, the seat of Sir Ralph Blois, Bart., have just been completed. The whole of the work has been executed from the designs, and under the superintendence, of Mr. E. F. Bisshopp, architect and Diocesan Surveyor. Mr. Alfred Brown, of Braintree, was the contractor; Messrs. John Groom & Son, Ipswich, executed the carving and chimney-pieces; and Mr. George Bedingfield, Ipswich, the plaster ceilings.

SCHOOL, QUEENSBURY, YORKSHIRE.—The new school erected by the Queensbury School Board at Fox Hill was opened on the 21st ult. The school is built on the central hall system, and is a stone building, affording accommodation for about 275 children. Messrs. John Drake & Son, of Queensbury, have been the architects.

HOTEL VICTORIA, NEWMARKET.—This building has been erected on the site of the old Greyhound, Newmarket. The hotel is fireproof, and five stories in height, and lighted throughout by electricity produced on the premises by a 40 h.p. gas engine and dynamo placed in the basement. The architect was Mr. Walter Emden.

FACTORY EXTENSION, RUSHDEN.—Additions to Messrs. Cave's factory, Rushden, are nearing completion. The new building extends from the old factory to the full extent of Alfred-street and along the lane to the "Rose and Crown," High-street. Messrs. Moseley & Anderson, of Northampton, were the architects for the work, and the contractor was Mr. Robert Cosford, of Northampton, the contract price being 7,700*l.* The new premises are designed to accommodate an additional 500 workmen.

THEATRE, KENNINGTON PARK-ROAD, LONDON.—The latest addition to the suburban places of entertainment is the theatre at Kennington Park-road. It is to be built from the plans of Mr. W. R. G. Sprague. It will, it is said, have frontages of about 80 ft. to Kennington Park-road, 150 ft. to South-place, and 90 ft. to De Laune-street.

SANITARY AND ENGINEERING NEWS.

HULL ELECTRICAL EXHIBITION.—The electrical and industrial exhibition which will be held from May 19 to June 4 next, at Hull, promises to be successful. The principal objects of the exhibition are those connected with the applications of electricity to practical work. It is under distinguished patronage, and we were favourably impressed with the list of gentlemen who had consented to act as jurors and referees. The great demand there is at Hull, which has now a population of 225,000, for electric lighting is necessitating large extensions of the Corporation Electricity Works, and should afford a large field for the supply of materials, fittings, instruments, &c. Manufacturers should take this into consideration. Hull has extensive manufacturing industries, and a very flourishing shipping trade, and a good exhibition of the numerous industrial applications of electric motors, for example, would doubtless create a demand for them.

DRAINAGE SCHEMES, BROMSGROVE.—At the meeting of the Bromsgrove Rural District Council, on the 22nd ult., the schemes of Mr. Martin, engineer, for the drainage of Pedmore and Blakedown were adopted. It was decided to endeavour to make an arrangement with the Stourbridge Main Drainage Board to take and deal with the sewage of Pedmore, and the clerk was directed to apply to the Local Government Board for permission to borrow 2,750*l.* for the Pedmore, and 1,100*l.* for the Blakedown scheme.

PAVING, &C., SCHEME, CROYDON.—Mr. H. H. Law, C.E., one of the inspectors of the Local Government Board, held an inquiry at the Town Hall, Croydon, a few days ago, into the application of the County Council to borrow 40,355*l.* for kerbing, channelling, &c.; 1,475*l.* for the further improvement of George-street; 7,000*l.* for Norbury drainage; 550*l.* for an outfall sewer at South Norwood; and 500*l.* for an additional settling tank on South Norwood Farm. The first items taken were three, amounting to 8,050*l.*, for drainage purposes. Mr. T. Walker, Borough Engineer, explained the plans in detail to the Inspector, and stated that they had a provisional agreement with Messrs. Carter for land on which to erect the pumping station at Norbury, which was the lowest portion of the borough. The settling tank would be circular in form, composed of concrete, and the size would be about 60 ft. The outfall sewer would be close to Norwood Junction Station, and was intended to replace very old sewers put in forty or fifty years ago. The proposal was to lay a new sewer through into Lovelane, instead of coming down the Harrington-road and meeting at a junction there. In the item of 1,475*l.* for widening George-street, the Town Clerk stated that the widening was being carried out gradually as premises were pulled down. On the application for permission to borrow 40,355*l.* for kerbing, channelling, &c., the Town Clerk observed that the item of 8,000*l.* for kerbing, and 14,500*l.* for channelling were mainly for actually new works; not for replacing defective ones, but for channelling and kerbing where heretofore there had been none at all. Mr. Morgan, the road surveyor, stated that Val de Travers asphalte was to be used to replace worn out tar-paving. There was an item of 3,083*l.* for wood paving and concrete for laying in front of shops in narrow footways, and 2,000*l.* for new granite crossings.

A NEW RAILWAY IN BERKSHIRE.—The Lambourn Valley Railway, which will bring the town of Lambourn and a number of villages into direct connexion with the Great Western system at Newbury Junction, will be opened for traffic on the 4th inst. The line passes through several places which have not as yet had the advantage of railway accommodation, including Speen, Stockcross, Boxford, Welford, Stefford, East Garston, and East Bury. The works have been carried out by Messrs. Pearson & Co., Westminster.

LOCAL SEWERS IN LONDON.—The Main Drainage Committee of the London County Council has sanctioned the construction of the following local sewers:—Bermondsey: 212 ft. of 9-in. pipe sewer in Channel-row and New Church-street. Fulham: 580 ft. of 12-in. pipe sewer in Imperial-road. Greenwich: 230 ft. of 9-in. pipe sewer in Sandford-street, and 560 ft. of 3-ft. by 2-ft. brick sewer, and 60 ft. of 9-in. pipe sewer in Whitcher-street, Woodpecker-road. Hackney: 340 ft. of 12-in. pipe sewer through private ground between Brooksby's-walk and Coopersale-road. Hammersmith: 360 ft. of 15-in. and 330 ft. of 12-in. pipe sewers in Hamlet-gardens, King-street West. Hampstead: 490 ft. of 3-ft, by 2-ft. brick sewer and 370 ft. of 12-in. pipe and concrete sewer in Honeybourne-road; and 544 ft. of 3 ft. by 2 ft. brick sewer and 360 ft. of 12-in pipe and concrete sewer in Crediton-road. Islington: 136 ft. of 15-in. pipe and concrete sewer in Highbury-crescent West. Lewisham: 730 ft. of 12-in. and 170 ft. of 6-in. pipe and concrete sewer in Homecroft-road. Plumstead: 500 ft. of 9-in. pipe and concrete sewer in Church-manorway. St. Giles: 320 ft. of 4-ft. by 2-ft. 6-in. brick sewer in Great Queen-street; 135 ft. of 12-in. pipe sewer in Galen-place; and 460 ft. of underpinning in Clark's and Smart's-buildings. St. Martin-in-the-Fields: 290 ft. and 488 ft. of 4-ft. by 2-ft. 8-in. brick sewer in Chandos-street and Craven-street respectively. Wandsworth: 364 ft. of 12-in. inch pipe and concrete sewer in Bromells-road.

STAINED GLASS AND DECORATION.

MEMORIAL WINDOWS, ALLEYN'S COLLEGE.—Two memorial windows have just been placed in the chapel of Alleyn's College of God's Gift, at Dulwich, by Messrs. Charles & Ernest Mitchell, in memory of their father, the late Mr. W. J. Mitchell, builder, contractor, and sanitary engineer, of Dulwich, who died on July 1, 1897, and who was for many years a Director of the Builders' Benevolent Institution, a member of the Institute of Builders, and of the Tilers' and Bricklayers' Company. The windows are the work of Messrs. Heaton, Butler, & Bayne.

WINDOW, STAINTON-IN-CLEVELAND CHURCH.—The Bishop of Hull dedicated recently a memorial window in the Parish Church, Stainton-in-Cleveland, to the memory of the late Mr. William Rhodes Fawcett, of Stainton Grange. The window was the work of Messrs. Heaton, Butler, & Bayne, of London.

WINDOWS, ST. PATRICK'S CATHEDRAL, ARMAGH.—Two stained-glass windows have just been completed in the southern aisle of St. Patrick's Cathedral, Armagh. Each of the windows consists of three lights. Two religious scenes, one above the other, are depicted in each window. The windows have been erected by Messrs. Mayer & Co.

ELECTRIC LIGHTING WORKS, TORQUAY.—Torquay Electric Lighting Works have just been opened. Mr. W. H. Trentham was the electrical engineer.

FOREIGN.

FRANCE.—A group of architects have opened, at 40, Rue Denfert Rochereau, an exhibition of water colours under the title of the "Salon de l'Arc-en-Ciel."——The work of restoration on the façade of the church of St. Eustache is completed.——The new Hotel de Ville of Levallois Perret, of which Mr. M. Jamin is the architect, was opened on Sunday last.——A fine basrelief by Carpeaux, representing the Emperor Napoleon III. restoring Abdel Kadir to liberty, has been placed in the Versailles Museum. The work formed one of the exhibits at the Salon of 1852.——M. Manin, architect, has been commissioned to erect a new hospital at Longjumeau.——The works for the new railway of the Celles Valley, in the Vosges, are to be commenced shortly, at an estimated cost of 1,750,000 francs.——M. Gillet, architect to the Department of the Marne, has been commissioned to oversee the construction of a circus building at Châlons-sur-Marne,——The Fine Art Exhibition at Lille was opened on March 25, and will remain open till May 10.——The municipality of Nice have commissioned M. Alfred Lenoir, the sculptor, to execute the monument to be erected there to the memory of the brothers Goncourt.——M. Paul Gout, Government architect, has been commissioned by the Department of Fine Arts to continue the work of restoration at Mont St. Michel, in place of the late M. Petitgrand.——There is talk of commencing, in the Department of Bouches du Rhone, works of drainage and irrigation on a large scale, for the whole delta of the Rhone. The operation will, if carried out, mean the reclamation of nearly 100,000 acres of land for agricultural purposes.——A new tidal basin is to be carried out at Boulogne-sur-Mer, at a cost of somewhat over five million francs.——The Municipal Council of Paris intend to erect monuments to Garibaldi and to the Socialist philosopher Fourrier.

CALCUTTA.—The equestrian statue of Lord Roberts lately erected at Calcutta was unveiled on March 2 by the Viceroy, Lord Elgin. The statue occupies a site in the centre of the Red-road, on the west. At either end of the pedestal are allegorical figures symbolising Courage and Fortitude. The friezes encircling the pedestal represent the march from Kabul to Kandahar. Both statue and pedestal were designed by Mr. Harry Bates, A.R.A.

MISCELLANEOUS.

GOOD FRIDAY WEEK. — In consequence of the Easter holidays, next week we go to press a day earlier than usual. All communications for the Editor must reach him by the *first post on Wednesday* morning, except lists of tenders, which will be received up to 10 a.m. of the same day.

PROFESSIONAL AND BUSINESS ANNOUNCEMENTS. —Messrs. Veronese, fibrous plaster manufacturers, have removed their West End office to 12, Norfolk-street, Strand.

MEMORIAL FOUNTAIN, WALWORTH.—The disused burial ground at the rear of the Browning Hall, York-street, Walworth, is being transformed into the "Browning Garden." A drinking fountain in Doulton ware has been promised by Mr. Lewis Doulton as a memorial of his father, the late Sir Henry Doulton, who was baptised in the building. It is intended to open the garden on the anniversary of Browning's baptism in June next.

CHARING CROSS HOSPITAL.—At the last annual general court of the governors it was announced that the Commissioners of Woods and Forests had agreed to sell on certain conditions for 16,114*l.* the freeholds of Nos. 23-7, King William-street, the site of "Toole's Theatre," and Nos. 15-6, Chandos-street, being the ground upon which it is proposed to build a new out-patient department, with other improvements, for the hospital, when sufficient funds shall have been subscribed.

YORKSHIRE FEDERATION OF BUILDING TRADE EMPLOYERS.—A meeting of the Executive of the Yorkshire Federation of Building Trade Employers was held at the Royal Exchange, Leeds, on the 24th ult. In the absence of the President (Alderman Jessop, Mayor of Huddersfield), Mr. John Spink, of Sheffield, occupied the chair, and there were present representatives from Leeds, Bradford, Hull, Halifax, Huddersfield, and Sheffield. Several matters of interest occupied the attention of the Executive. In connexion with the Workmen's Compensation Act a number of suggestions were made in regard to a system of mutual assurances among employers in the building trades. The Executive strongly favoured the idea of such assurance, and after inquiries have been made a recommendation will be submitted to the various associations in Yorkshire. An effort is about to be made by means of deputations and circulars to increase the strength of the Federation, and all Yorkshire towns not at present federated are to be visited. The Federation is applying for affiliation with the National Association of Master Builders. Some discussion took place with regard to the custom prevailing among certain architects and engineers of demanding price quantities with every tender at the time of tendering. This is strongly resented by the building trade, and the Executive suggest that the Federation adopt means whereby the practice may be greatly lessened, if not altogether abolished. The Executive strongly recommended that a uniform contract agreement form should, if possible, be adopted. The demand that has recently been made for an advance of wages in various towns was also under consideration.

PETERHEAD BURGH SURVEYORSHIP. — Mr. J. Chisholm has just been appointed successor to Mr. Alex. Geils, late Burgh Surveyor and Sanitary Inspector, Peterhead.

BROCKLESBY HALL, LINCOLNSHIRE.—The fire that broke out last Saturday at Lord Yarborough's seat destroyed the north-east wing of the house, containing the library and most of the principal apartments—the damage to the building and its contents, including books, pictures, and other works of art, being estimated at 22,000*l.* The picture gallery, measuring 63 ft. by 48 ft., and 20 ft. high, was designed by C. Heathcote Tatham (1806-7) for Charles, first Lord Yarborough, to whom some valuable paintings had been bequeathed by Mr. Aufere, of Chelsea. At the main gates is a stone archway erected by the tenants and others to the memory of the second Earl, *ob.* 1862; in a "riding" in the grounds is the mausoleum built 1787-95 for his ancestor, Baron Yarborough, by James Wyatt. It stands upon an ancient tumulus, and is in the form of a peripteral temple, having twelve fluted Doric columns resting upon a rusticated base or stylobate 50 ft. in diameter; the frieze is carved with garlands and bull's-heads. The cella, 40 ft. outside diameter, has four external niches, circular-headed, with a sarcophagus in each; its interior, divided into four compartments by eight fluted Corinthian pillars, is lighted through the top of a dome, which rises from within a balustrade above the outer entablature. Tatham published in 1811 a folio volume to illustrate the picture gallery and mausoleum; of the latter a view will be found in the second volume of Allen's "Lincolnshire," 4to, 1834.

STATUE, WEST HARTLEPOOL.—The statue of Sir William Gray, West Hartlepool, has just been unveiled. It is situated to the west of Christ Church. The sculptor, Mr. William Day Keyworth, jun., of London and Hull, has represented Sir William during the time that he was Mayor of West Hartlepool, 1887-8, in his robes and chain of office, seated in the chief magistrate's chair.

ELECTRIC LIGHTING AT SOUTHPORT.—Colonel C. H. Luard, C.E., held an inquiry recently at the Southport Town Hall, on behalf of the Local Government Board, into an application by the Southport Town Council for power to borrow 21,178*l.* for electric lighting and 18,070*l.* for street improvements. There has been a rapid increase in the demand for electricity, the number of eight-candle power lamps connected having grown from 534 in March, 1895, to 24,669 in March, 1898, while there are applications for 2,000 more. As to the application respecting the street improvements, the Town Clerk (Dr. J. Davies Williams) stated that the Council proposed to repave nearly three miles of streets.

LITANY DESK, BOVEY TRACEY.—A new Litany desk has just been placed in the Church of St. Thomas à Becket, Bovey Tracey. It is of the fifteenth century Gothic style, and is of English oak. The work has been executed by Messrs. Harry Hems & Sons, of Exeter.

THE METROPOLITAN ASYLUMS BOARD. — Sir Edwin Galsworthy presided on the 26th ult. over a meeting of the Metropolitan Asylums Board, held at the County Hall, Spring Gardens. With regard to the contract for alterations and additions at the South-Western Hospital, Mr. T. W. Aldwinckle reported that the total account came to 28,857*l.*, an excess of 4,557*l.*, on the sealed contract. In explanation it was stated that additional foundations were found to be absolutely necessary, while it was impossible to re-use any of the old laundry machinery, thus causing extra expense on engineering work. Drainage was responsible for 586*l.*; but 370*l.* was due from the Lambeth Vestry in respect to the new laundry wall. On the motion of Mr. Scovell, seconded by Mr. Brass, the report was referred to the Finance Committee. According to notice, Mr. Brass moved:—"That the whole question of the expenditure on the Brook Hospital, together with all reports and other documents having reference thereto, be referred to the General Purposes Committee, with directions to instruct a solicitor to take the opinion of counsel as to the liability of the architect, Mr. T. W. Aldwinckle, to refund the managers all or any portion of the costs of the extra works or claims ordered or allowed by him on his own responsibility." Mr. Brass said he had no desire to go over again the circumstances in connexion with the large excess on the Brook Hospital contract, but he thought it was absolutely necessary that they should know what the position was with regard to work undertaken by the architect on his own responsibility.—Mr. Purchese thought it was a step in the right direction to ascertain whether the architect had the power to do what he liked with the public purse.—Mr. White said he did not agree with the form of the resolution, but he thought their position with regard to extras generally should be more accurately defined. He moved as an amendment that the whole question of their liability for such charges be referred to the General Purposes Committee, with power to take legal opinion.—The amendment was adopted.

APPOINTMENT OF SANITARY INSPECTORS. — The Local Government Board has sanctioned the appointment as Sanitary Inspectors in the undermentioned districts of—Mr. W. J. Perrin, in Lambeth; Mr. J. R. Bagshaw, in Lewisham; and Mr. J. C. Wilson, in Newington.

FEDERATION OF BUILDING TRADE EMPLOYERS: SUNDERLAND MEETING.—At the Empress Hotel, Sunderland, a few days ago, delegates representing the various master builders' associations in the northern counties again met for the purpose of formulating a code of rules and discussing other matters in connexion with the Northern Federation of Building Trade Employers, which will embrace the counties of Northumberland, Durham, Cumberland, and Westmorland.

CAPITAL AND LABOUR.

WAGES AND HOURS IN THE BIRMINGHAM BUILDING TRADE.—Since last October negotiations have been carried on between the representatives of the builders connected with the Birmingham Master Builders' Association and the representatives of the operatives in the various sections of the trade, excepting the bricklayers, with a view to arriving at an amicable settlement of important matters affecting the industry, and arising out of a series of demands made on behalf of the men. The period for the expiration of the notices issued in October terminated with the close of March, and so far no settlement has been arrived at. Under the arrangements which of late years have worked so admirably between employers and employed, it is stipulated that notices affecting a change in the rate of wages or an alteration of rules shall be given six months in advance, from fixed periods, and it is in accordance with these that the employers were served in October with requisitions for various alterations of rules affecting working hours, &c., and, what was more important still, applications for general advances in wages. The alterations desired in the scale of pay are as follow:—Carpenters from 9d. to 10d. per hour, plasterers 9d. to 10d., masons 9d. to 10d., masons (fixers) 9¾d. to 10¾d., plumbers 9d. to 10d., labourers 6d. to 6¾d., and scaffolders 6¾d. to 7d. It is asserted by the masters that the advances asked, especially in the skilled trades, are altogether unprecedented, and distinctly out of proportion to the rates of wages paid in other places. For instance, it has invariably been recognised that the rate of pay in the skilled branches of the building trade in London should show an advance of 1d. per hour upon that paid in Birmingham. In the cases cited the advances asked for in Birmingham would bring the scale equal to that existing in the Metropolis. Then, again, it is contended that the present rate of wages in Birmingham is much in advance of such places as Wolverhampton, Leicester, Nottingham, Derby, Rugby, and other places in the Midlands. Probably the most serious aspect for the employers is the vast difference the demanded increases would make in existing contracts. Many of these extend over a long period, and have been accepted on what was considered the settled basis of the scales of pay as now existing. In some cases the employers affirm that it is no exaggeration to say that the granting of the advances would mean the barest of margins for the contractors, if not absolute ruin to many. Therefore, it is sincerely to be hoped that wise counsels among the men will prevail, especially as the employers have expressed their willingness to make certain concessions. On the question of the increased pay they are firmly convinced that it cannot be given effect to in any form this year, but have promised an increase of one halfpenny per hour to date from April, 1899, and with regard to a reduction of hours and other minor alterations they are willing for these to come about from the 1st inst. These propositions were submitted to the men some time ago and rejected. The operatives asked for an immediate advance of one halfpenny per hour, and the promise of the other halfpenny next year, and the masters declining a deadlock in the negotiations has existed for some time. The men, however, have requested to meet the masters again in conciliation, and these requests have been granted.—*Birmingham Post.*

DEWSBURY BUILDERS' LABOURERS.—The Executive Committee of the Spen Valley Builders and Contractors' Association met recently at Cleckheaton to discuss various matters affecting the building trade in the district. Their attention was called to the threatened trade dispute at Dewsbury. The Association had given a week's notice to the Dewsbury Builders and Labourers' Association of a reduction of labourers' wages from 6d. to 5½d. per hour, to commence on March 28, and to extend over a period of six months. This reduction the men have decided to resist. The masters have taken this step in consequence of the proceedings of the men some months ago. It had been previously arranged between the masters and men that either side should give six months' notice of any contemplated reduction or raising of wages, but the men last summer, the masters allege, took advantage of an opportunity when the employers were full of contracts, and gave a week's notice for an advance in wages. This was a distinct breach of the arrangement, and the masters are now giving notice, of the same length of time, to the men to reduce

the wages to the former level, in order that they (if they think fit) might give the proper notice, as originally agreed upon. A deputation from the Association was appointed to discuss the position. The question of altering the name of the Association was considered.——The Spen Valley Employés' Accident Assurance Company met the same evening, and discussed the position in consequence of the new Workmen's Compensation Act. Negotiations are in progress between some of the companies and the Spen Valley Company.

DISPUTE IN THE CARPENTRY TRADE, COALVILLE, LEICESTERSHIRE.—An adjourned meeting of the Operative Carpenters and Joiners was held at the Red House Hotel recently, when the whole of the shops in the district were represented. After discussion, it was decided to adhere to the 1d. per hour advance, of which the employers have had due notice, and it was further resolved that unless the advance be granted to stop work on March 31. A deputation was appointed to meet the employers to discuss the question, should it be desired.

COVENTRY PLUMBERS AND MASTER BUILDERS.—The negotiations pending between the Coventry plumbers, painters, and glaziers and the master builders are at present in a condition of deadlock. The masters are determined in their refusal to recognise the new society of plumbers, apart from the Plumbers', Painters' and Glaziers' Society. They are willing to concede the additional ½d. per hour asked for, but will not accept the new rules which would have the effect of limiting the plumbers to plumbing work, whereas they are now what is known as "three-branch-hands," and work at either painting or glazing when there is no plumbing for them to do, receiving throughout the higher rate of wages paid to plumbers.—*Coventry Herald.*

LEGAL.

ACTION AGAINST A PAIGNTON SURVEYOR.

AT the Churston County Court, on the 22nd ult.' before his Honour Judge Edge, Marcus Bridgman, builder and contractor, of Paignton, sued F. W. Vanstone, architect and surveyor, of Paignton, for 12*l.* 18., for damage sustained by reason of defects in a bill of quantities supplied by the defendant, and 6*l.* 10s. balance due for money lent. The sum of 7*l.* 6s. was paid into court, with a denial of liability. Mr. J. B. Eastley, for plaintiff, and Mr. T. W. Windeatt for defendant. Mr. Eastley said that besides acting in his private capacity, defendant was also Surveyor to the District Council of Paignton. In October, 1896, the Council required certain work to be done to Tower-road, Paignton, for which defendant, as their surveyor, had to prepare specifications and plans. Tenders were invited in the usual way, and amongst others who tendered was the plaintiff, who instructed defendant in his private capacity to draw up a bill of quantities. Defendant did so, and added a footnote that "these quantities are not official, but are prepared by the surveyor in his private capacity." It was for gross mistakes made in the bill of quantities, by which plaintiff suffered loss, that the present action was brought. In the specifications it was provided that two lamps should be supplied and connected with the gas mains. In the bill of quantities no distances were given, and plaintiff understanding that that meant that the main was close, allowed 4s. 6d. for each lamp. As a matter of fact, he had to lay 125 ft. in one case and 170 ft. in the other, costing 8*l.* 10s. Plaintiff, in the first instance, claimed against the Council for the extra amount of piping, and on a reference to arbitration, a verdict was given for the Council on the ground that the bill of quantities was no part of the contract.

Mr. Windeatt suggested that it was the contractor's place to find out where the gas main was, but the Judge said, in that case, what was the good of having a quantity surveyor. If defendant was to argue for the next six months he would not convince him to the contrary. It was certainly his duty to inquire where the gas main was, either of the company or the contractor.

Mr. Windeatt: As I am instructed, it was never the practice for the quantity surveyor to find out distances.

His Honour: If you bring me fifty witnesses, I shall decide against you. It may be the practice, but I shall not give the smallest weight to it. A quantity surveyor would be utterly useless if such a state of things was allowed.

After further argument, defendant, at his own request, entered the witness box, and said it would have made no difference to his bill of quantities if he had known where the gas main was. Plaintiff would have had to ascertain the distance.

Eventually a verdict was entered for plaintiff for 8*l.* 1s., in addition to 7*l.* 6s. paid into Court, total 15*l.* 7s., with costs, payable 2*l.* a month.—*Western Mercury.*

MEETINGS.

FRIDAY, APRIL 1.

Institution of Junior Engineers (Westminster Palace Hotel).—Mr. J. T. H. Burrell on "Mechanical Refrigeration." 8 p.m.

SATURDAY, APRIL 2.

Architectural Association.—Fifth Spring Visit to New Public Baths and Free Library, Pitfield-street, Shoreditch. 2.30 p.m.

Royal Institution.—Mr. Lionel Cust on "Portraits as Historical Documents; Portraits as Monuments." I. 3 p.m.

Institution of Junior Engineers.—Visit to the Thames Ironworks, Blackwall. 11 a.m.

British Institute of Certified Carpenters.—Annual Dinner at the Bridge House Hotel, London Bridge, at 6 p.m.

Sanitary Institute (Demonstrations for Sanitary Officers).—Inspection at Morden Hall Farm, Morden, Surrey. 3 p.m.

Sanitary Inspectors' Association (Carpenters' Hall, London Wall).—Mr. T. J. Moss-Flower on "Sanitation in the Homes of the Working Classes." 6 p.m.

MONDAY, APRIL 4.

Royal Institute of British Architects.—M. G. Harmand, Avocat à la Cour d'Appel, Paris, on "Artistic Copyright." 8 p.m.

Royal Institution.—Mr. Lionel Cust on "Portraits as Historical Documents; Portraits as Monuments." II. 3 p.m.

Sanitary Institute (Lectures for Sanitary Officers).—Mr. W. C. Tyndale on "House Drainage." 8 p.m.

Liverpool Architectural Society.—Mr. W. H. Bidlake on "The Quality of Strength in Architecture." 6 p.m.

Society of Engineers.—Dr. J. C. Thresh on "The Protection of Underground Water Supplies." 7.30 p.m.

TUESDAY, APRIL 5.

Builders' Clerks' Benevolent Institution.—Twentieth annual dinner, King's Hall, Holborn Restaurant. 6 p.m.

Institution of Civil Engineers.—Paper to be further discussed: "Extraordinary Floods in Southern India; their Causes, and Destructive Effects on Railway Works," by Mr. E. W. Stoney; and, time permitting, Mr. A. H. Preece will read a paper on "The Electricity Supply of London." 8 p.m,

WEDNESDAY, APRIL 6.

Royal Archæological Institute.—(1) Mr. Talfourd Ely on "The Antiquities of Hayling Island." (2) The Worshipful Chancellor Ferguson on "More Picture Board Dummies." 4 p.m.

British Archæological Association.—Miss Russell on "Characters of Wolsey's Inscription at Oxford compared with those of Older Ones in Scotland." 8 p.m.

Sanitary Institute.—A discussion will be opened by Mr. R. E. Middleton on "The Desirability of Making Water-shed Areas and Sanitary Districts Co-terminous." 8 p.m.

Crystal Palace School of Practical Engineering.—Announcement of the List of Certificates awarded by the Examiners. Sir Henry C. Mance, President of the Institution of Electrical Engineers, will take the chair at 12 (noon).

Builders' Foremen and Clerks of Works Institution.—Ordinary meeting of the members. 8 p.m.

Sanitary Institute (Demonstrations for Sanitary Officers).—Inspection in the Parish of St. George's, Hanover Square. 2 p.m.

Edinburgh Architectural Association.—Bailie Pollard on "Fever Hospital Structure; with Special Reference to the New Edinburgh City Hospital, Colinton Mains." 8 p.m.

Edinburgh Architectural Society.—Mr. John Kennedy on "Building Stones: Their Uses and Preparation." 8 p.m.

SATURDAY, APRIL 9.

Edinburgh Architectural Association.—Visit to Dalkeith Palace and Dalkeith Church.

RECENT PATENTS:

ABSTRACTS OF ACCEPTED SPECIFICATIONS.

Open to opposition until May 9.

[1896.] 27,356.—MAKING TACKS, NAILS, AND THE LIKE FROM WIRE: *M. L. May.*—This is effected by pressing steel plates against one another whereby a circular wire between them is flattened out and shaped prismatically; two pressing-cheeks move about strong pivots, and their even surfaces of contact fit quite closely; a forward motion and a retrograde motion are given in turn by a lever to movable pressing-pins whose cutting corners press the wire into a four-cornered section, and at the same time give it a tapering form, and cut it to the required length.

[1897.] 6,032.—AUTOMATIC BRAKE FOR HOISTS, &c.: *W. T. Eades.*—The lifting wheel of a double-lift pulley block has an automatic break or load-sustainer, so constructed that, whilst it allows the main shaft to have a free circular movement in one or other direction for raising or lowering when turned or driven from the hand wheel end, the shaft is prevented from rotating in either direction on the application of pressure or driving force at the opposite or load wheel end; the brake mechanism comprises a cam-shaped block, loosely mounted, with clearance for lateral play, on the sleeve of the axle bearing placed axially within a circular chamber of the block; during ordinary raising or lowering the outer edges of the expanding parts of the brake are carried round with the axle, but when driving power upon the hand wheel is relieved, the back pressure of the load exerts itself through the load wheel and gear upon the load end of the axle which transmits its motion to a radial arm which acts upon the inside of the lug or snug of a cam or wedge, whereupon the expanding motion brings into contact the opposed surfaces of the cam, wedge, and chamber, and causes a jambing action for sustaining the load.

6,388.—ROLLERS FOR WINDOW BLINDS, SUNSHADES, &c.: *W. C. Kincaid.*—The roller consists of a slotted tube having end pieces and enclosing a lath or rod over which the looped end of the blind or fabric is passed, whilst the blind hangs down from the lath through the slotted tube.

7,292.—A WINDOW HINGE: *F. Krenzin.*—This device, applicable to French sash windows, consists in fixing rotary cramp-irons to the sash and frame, in operating the guiding of each sash by guide-pins fixed above and below the sash, and sliding in grooves in the frame.

8,210.—VENTILATORS: *A. R. Tiltman.*—The invention relates more especially to inlet ventilators, but is applicable to outlet ventilators; the improvement lies in making the regulating inlet or outlet flap with a transparent part through which the interior of the ventilator box or tube can be inspected; the sheet of glass or other transparen material forms part of the regulating inlet flap, hinged at its lower edge.

8,484.—MANUFACTURE OF BRICKS, TILES, &c.: *M. Ahern.*—The inventor mixes together crude shale, calcined shale, Derby sandstone, and clay, in about equal parts; he grinds the mixture fine and makes it up with water (dirty water, such as that which runs from gas-works, he finds is even better than clean water) for moulding. For red colour, the quantity of sandstone is reduced; for white colour, about one-quarter part of lime or chalk is added.

8,634.—SYPHON FLUSHING CISTERNS: *T. W. Woodhouse.*—An essential part of the invention is the arrangement of a lever, applicable to other kinds of cisterns; the lever works upon two fulcra, is divided so as to encircle the upper part of the syphon tube, and has a broad hook engaging in a rectangular slot at the top of the inverted cup.

8,711.—FIREGRATES AND DOMESTIC HEATING STOVES: *W. H. Webber & W. E. Price.*—For firegrates, rocking or removable bars are combined with front firebars sloping inwards from the bottom to the top, and a sliding perforated draw-plate or blower is provided in the grate casing; the draw-plate is latticed, or of wire-gauze.

9,073.—SLABS FOR THE BEDS OF BILLIARD TABLES, &c.; STEPS AND BLOCKS FOR BUILDING PURPOSES, PILLARS, COLUMNS, CHIMNEY-POTS, PIPES, BATHS, SINKS, AND OTHER HOLLOW ARTICLES OR VESSELS: *D. Wilson.*—These are made by coating metal frames or cores with, or embedding them in, a cement or concrete consisting of Portland cement and crushed or powdered slate mixed together, the mixture being brought to a convenient consistency immediately prior to use by adding thereto either water or a solution of silicate of soda or silicate of potash—say, 1 lb. weight of either to 1 gallon of water.

9,622.—SYPHON WATER-CLOSETS: *H. M. Craig.*—To ensure a readier starting of the syphonic action the inventor contracts the upper end of the long leg of the syphon just below the point of its junction to the upper end of the outlet, and below the contracted or narrowed part he gradually widens the leg, and then again contracts it at the lower end of the syphon leg.

9,775.—WHITE LEAD: *J. S. MacArthur.*—To a solution of lead tartrate formed as is described in his former specification (9,655, 1894), the inventor adds ammonia before treatment with carbonic acid; an excess of carbonic acid after precipitation may be removed by the addition of fresh lead tartrate. The solution is made of lead oxide dissolved in a solution of soda or of potash, or a mixture thereof, or of "Rochelle salt," at a boiling temperature.

10,091.—MANUFACTURE OF TILES: *W. Hewitt.*—The undercuts in the tile are formed by means of loose pieces adapted to slide in inclined slots in the back plate of the die; when the pressure is relieved and the bottom plate of the die is raised, the loose pieces drop in their slots until their upper faces become level with the face of the back plate (which is formed in two horizontal parts), and to ensure their falling, springs are placed between the upper surfaces of shoulders of the pieces and the plate.

10,236.—INDICATING AND CORRECTING UNEQUAL TENSIONS OF MULTIPLE ROPES FOR HOISTS, &c.: *R. Middleton.*—Underneath the attachment of each rope is arranged an elastic member—say, a compressed spring—which extends itself whenever such rope is elongated to excess; the extension of the spring throws an electric battery into circuit with an alarm bell which continues to ring until the rope is re-tightened. The re-adjustment of the rope is effected by making it end in the form of a screwed rod, the tightening-up of the nut of which breaks the electric communication when the spring is drawn back into its place.

12,255.—CONTROLLING THE MOVEMENT OF DOORS: *J. D. Postle.*—The contrivance, attached to the front or back of the door, comprises a sliding and partially revolving rod raised and lowered by a handle connected therewith by a stud moving, by means of a roller, in a helical slot terminating in rests.

17,197.—LADDERS: *J. Barstow & Sons.*—For a ladder that may serve as either a step ladder or a long ladder, two ladders are coupled together, one within the other, the second rung from the top of the longer or main ladder forming the hinge and serving as the end rung of the shorter ladder. The main ladder's top rung is removeable, and when the step ladder is extended to form a long ladder the loose rung is passed through both parts and holds the two rigidly together.

NEW APPLICATIONS.

For week ending March 19.

6,164, C. H. Guest, Acetylene Lamps. 6,171, G. W. Beldam, Manhole Inspection and Similar Coverings. 6,176, P. Dobson, Window Fasteners. 6,178, J. C. Parker, Cooking Ranges. 6,185, G. Kerr, Fastening and Adjusting Door, Window, and Similar Knobs. 6,187, J. Goddard, Cage-Hoist Stopping and Locking Arrangement. 6,198, C. W. Brownson, Door Knob Spindles. 6,206, J. A. Henesey, Basin Clamps. 6,207, A. Csorba, Trestle for Scaffolding. 6,223, B. C. Seaton, Electric Railways. 6,225, Rosenholz Rock Drill Company, Rock and the like Drills. 6,233, C. F. Fogg, Tensioning and Cutting Apparatus. 6,235, J. W. Boch, Electrical Insulators. 6,239, C. H. Early, Jockeys or Gripping Devices for Mechanical Haulage. 6,240, De Sales & Charbonnee, Liquid Fuel and Heating Contrivances. 6,243, J. A. Rooney, Combined Square and Protractor. 6,244, J. O'Sullivan, and 6,518, C. E. Cooper, Fire Escapes. 6,245, J. T. Smith, Sash Fasteners. 6,263, Melhuish & Brookes, a Bucket Bottom. 6,284, R. D. Smillie, and 6,588, W. H. Siddle, Solder. 6,293, C. H. Keats, Crushing and Granulating Machines. 6,295, Wales & Cunningham, Enamel Paint. 6,306, P. Rataud, Decoration of Fictile, Glass, Papier-Mâché, Enamelled Iron, Tin, and other Materials. 6,308, R. G. Burn, Cast and Drawn Lead Traps. 6,310, Reids, Light River Dredges. 6,318, Annie F. England, for Regulating the Sizes of Fires in Ranges and Grates. 6,324, J. S. Beeman, Quick-drying Inks, Paints, &c. 6,326, H. E. Nicholson, Fastenings for Tool Handles. 6,332, E. H. Ristic, Lock Attachment. 6,362, Gillies & Hornidge, Electric Switches. 6,365, C. Sainty, Key or Wrench for Use by Turncocks, Plumbers, Gasfitters, and Others, in operating Stop-cocks or Screw-down Ferrules on House Supplies. 6,372-3, L. Sterne, Condensing and Water Cooling Apparatus, and Cold-storage Buildings. 6,375, Nordisk Riklame Kompagni (Denmark), Optical Projection Apparatus. 6,376, A. Hills, Filing Machine. 6,378, D. M. Allen, Safety Window-cleaning Device. 6,380, J. Collinge, Flushing Water-closets. 6,403, Smith & Campbell, Pipe Wrenches. 6,413, G. S. Robb, Window Blinds. 6,414, T. Topping, Electric Plug and Ordinary Switches. 6,433, Lady Mabel Lindsay, Grip or Clutch Device for Ropes, Cords, &c., for Suspending Purposes.

6,439, W. Hargrove, Treadle-power Sawing Machines. 6,444, Cummings & Cronbie, Upright Drilling and like Apparatus. 6,450, Leonard & Hall, Syphoning or Flushing Apparatus, in part applicable to Door and other Catches. 6,452, C. Weyler, Bricks, Tiles, Slabs, Blocks, &c., for Floors, Vaults, Roofs, and the like. 6,454-5, A. Mauser, Fencing Chains, and a Spiked Band for Building Purposes. 6,458, Clifford & Frith, Paving Bricks and Blocks. 6,485, H. Gerold, Butt Hinges. 6,488, G. Geppert, Ceilings. 6,506, W. J. Angell, Spanners. 6,511, J. T. Szék, Plastic Materials for Floors, Walls, Tiles, and other Moulded Articles. 6,516, C. Thomerson, Fixing Rain, Water, and other Pipes. 6,539, W. H. Harfield, Windlasses. 6,544, G. Turner, Lead Glazing for Building Purposes. 6,555, J. Solomon, Locking Apparatus for Safes, Strong Rooms, &c. 6,565, F. W. Barratt, Hot Water Heating Appliances. 6,572, J. Barker, "Fritt" and "Glaze" for Fictile Ware. 6,578, H. Sutcliffe, Pillar Lavatory and Pillar Bath Taps. 6,584, H. E. Taylor, White Lead. 6,591, H. Stephenson, Drain Testing Apparatus. 6,601, W. Tordoff, Flushing Cisterns. 6,604, A. H. Waller, Flush Tank Ball Valve. 6,622, S. S. Alcock, Combined Cinder Sifter and Dust-Bin. 6,627, A. Gorton, and 6,705 and 6,741, R. Ewing, Pipe Joints. 6,631, C. Green, Building Blocks, Tiles, &c. 6,634, Smit & Zoon, Centrifugal Pumps. 6,664, W. Jones, Combined Hydrant and Stand-pipe. 6,665, A. S. Gear, Street Fire Hydrants, applicable also for Flushing Drains and other Purposes. 6,677, Smith & Asquiths, Safety Doors and Gates for Lifts. 6,684, Normoyle & Baack, Pipe Couplings. 6,767-9, J. J. N. Halifax, Machines for Making Joints for Tubular Articles.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

March 17.—By BAXTER, PAYNE, & LEPPER (at Bromley).

Bromley, Kent.—1, 2, and 3, Devonshire-sq., u.t. 68 yrs., g.r. 7*l.* 10s., r. 49*l.* 8s. £300

March 18.—By THOMAS MARTIN (at Exeter).

Ottery St. Mary, Devon.—"Tipton Hall," and 11¼ a., f. 1,700
Various enclosures of land, 14 a., f. 1,030
Honiton, &c., Devon.—"Roodloft" or "Tower" Farm, 74 a., f. 1,300
Stockland, Devon.—"Barn Farm," 52 a., f. 425

By DYER, SON, & HILTON (at Blackheath).

Lee.—25, Burnt Ash-rd., u.t. 61½ yrs., g.r. 9*l.* 9s., r. 50*l.* 430
14, 16, 18, and 20, Taunton-rd., u.t. 62 yrs., g.r. 22*l.* 905
8 to 22 (even) and 28, Summerfield-st., u.t. 62 yrs., g.r. 28*l.* 7s. 640
50, 52, 54, and 56, Summerfield-st., u.t. 70 yrs., g.r. 14*l.* 280
75 and 77, Burnt Ash-rd., u.t. 66 yrs., g.r. 22*l.*, r. 75*l.* 520
Blackheath.—3 and 4, Rutland-gardens, u.t. 75 yrs., g.r. 18*l.* 670

By A. J. SHEFFIELD.

Limehouse.—102, West India Dock-rd., and plot of land in rear, f., r. 60*l.* 850
44, West India Dock-rd., f., r. 30*l.* 350
Poplar.—121, St. Leonard's-rd., and 22A, Tapley-st., u.t. 41 yrs., g.r. 4*l.*, e.r. 73*l.* 8s. 480
16 and 18, Guildford-rd., f., r. 46*l.* 16s. 495
Ratcliffe.—42, 44, and 46, Caroline-st., u.t. 56½ yrs., g.r. 13*l.* 13s. 255

March 19.—By STEPHENSON & ALEXANDER (at Cardiff).

Llandaff, Glamorgan.—"Tyn-y-Coed," u.t. 86½ yrs., g.r. 11*l.* 1,640
Penciseley-rd., a plot of land, 3 r. 9 p., f. 1,575

March 21.—By HENRY HOOPER.

Maida Vale.—36 and 42, Messina-av., u.t. 82½ yrs., g.r. 21*l.*, r. 80*l.* 700
Kensington.—42, Gratton-rd., u.t. 80 yrs., g.r. 11*l.* 2s. 440
Bermondsey.—53 and 55, Long-lane, u.t. 71 yrs., g.r. 75*l.* 2,450

By JENKINS & SONS.

Old Kent-rd.—Leroy-st., "The Woodman" p.-h., f.g.r. 21*l.*, reversion in 11½ yrs. 1,545
New Cross.—66, Lewisham High-rd., u.t. 54 yrs., g.r. 7*l.* 7s., r. 50*l.* 500

By ALFRED RICHARDS.

Enfield.—London-rd., "Lynton Dene," and nearly half an acre, f. 1,500
Dalston.—98, Shrubland-rd., u.t. 46½ yrs., g.r. 4*l.* 10s., r. 33*l.* 325
34, Holly-st., u.t. 21½ yrs., g.r. 4*l.*, r. 26*l.* 180

By S. WALKER & SON.

Catford.—21, 23, 25, 27, and 29, Bowness-rd., f. .. 1,625
4 to 16 (even), Jutland-rd., f. 2,235

By MESSRS. WOODS.

Poplar.—223, East India Dock-rd., f., e.r. 80*l.* 1,400
Cubitt Town.—125 and 127, Stebondale-st., u.t. 52½ yrs., g.r. 10*l.* 180

By WRIFORD & DIXONS.

Twickenham.—1 to 6, Horn-ter., f., r. 220*l.* 10s. .. 3,000
St. Peter's-rd., a plot of building land, f. 300
Bayswater.—9 and 10, Ledbury Mews North, u.t. 55 yrs., g.r. 27*l.*, r. 80*l.* 720

March 22.—By PHIBBS GIBSON.

Dulwich.—Croxted-rd., i.g.r. 12*l.* 3s., u.t. 65½ yrs., g.r. 3*l.* 1s. 200

By E. W. HARRIS.

Beckenham.—Blandford-rd., four plots of land, f.. 170
Elmers End-rd., three plots of land, f. 120

By WESTON & SON.

Tulse Hill.—108, Upper Tulse Hill, u.t. 23 yrs., g.r. 10*l.*, r. 85*l.* 310

By DEBENHAM, TEWSON, & CO.

Highbury Corner.—15 to 27 (odd), 31, 33, 35, and 45, Holloway-rd., area 22,356 ft., f. 14,000
South Hampstead.—113, Adelaide-rd., u.t. 47½ yrs., g.r. 17*l.* 10s. 900

By JOHN BOTT & SON.

Battersea.—43, Bridge-rd. West, u.t. 44 yrs., g.r. 11*l.*, r. 30*l.* 175
Herne Hill.—26, Lowden-rd., u.t. 68 yrs., g.r. 5*l.*, r. 28*l.* 285

By BEAN, BURNETT, & ELDRIDGE.

Bayswater.—30, Dawson-pl., f., e.r. 120*l.* 2,970
Ilford.—19, High-st., f., r. 120*l.* 2,400
Hampton Wick.—Seymour-rd., "Rosslyn," f., r. 50*l.* 690
Sydenham.—Oaksford-av., a plot of building land, f. 580
Panmure-rd., ten plots of building land, f. £1,012
South Norwood.—3 and 4, Spring-lane, u.t. 89½ yrs., g.r. 12*l.*, r. 56*l.* 445

By FIELD & SONS.

Bermondsey.—12, 13, 16, and 17, Wyld's-rents, f., r. 127*l.* 8s. 1,300
Camberwell.—89, 91, 93, and 95, Warner-rd., u.t. 33½ yrs., g.r. 11*l.* 16s. 10d., r. 115*l.* 750
Old Kent-rd.—14, 16, 18, and 20, Reddin's-rd., u.t. 77 yrs., g.r. 48*l.* 200
Brixton.—28, Trent-rd., u.t. 84 yrs., g.r. 9*l.*, r. 45*l.* 470

By C. & F. RUTLEY.

Leyton.—Ashville-rd., f.g.r. 18*l.* 18s., reversion in 82¾ yrs. 475

By MARK LIELL & SON.

Plaistow.—8, Stock-st., f., r. 22*l.* 230
Bow.—23, Lacey-st., u.t. 50 yrs.. g.r. 4*l.* 280
231, Bow-rd., with licensed slaughter-house, c., r. 36*l.* 610
1A and 3A, Chiltern-rd., u.t. 64 yrs., g.r. 7*l.* 500
Dalston.—14, Abersham-rd., u.t. 67 yrs., g.r. 6*l.*, r. 32*l.* 375
Stratford.—55 to 65 (odd), Howard's-rd., u.t. 67 yrs., g.r. 18*l.* 10s. 710
27, Atherton-rd., f., e.r. 50*l.* 790
Canning Town.—31 to 37 (odd), Catherine-st., u.t. 60 yrs., g.r. 14*l.* 450
Bromley-by-Bow.—58 to 66 (even), Bruce-rd., u.t. 85 yrs., g.r. 27*l.* 1,250
Forest Gate.—57A, Dame's-rd., u.t., 71 yrs., g.r. 7*l.*, r. 30*l.* 265
Stratford.—38 and 40, Hotham-st., u.t. 71 yrs., g.r. 7*l.* 250

By WYER, ADAMS, & GLOVER (at Masons' Hall Tavern).

Wandsworth.—York-rd., "The Princess of Wales" p.-h., u.t. 59 yrs. r. 100*l.*, with goodwill 17,520

By WORSFOLD & HAYWARD (at Dover).

Dover.—2, Clarendon-pl., f., r. 20*l.* 360
10 and 11, Victoria-st., f., r. 26*l.* 400
114, Snargate-st., f., r. 25*l.* 325
195 to 198, London-rd., f. 1,010

By ALFRED PREECE (at Clapham Junction).

Battersea.—2, 3, 8, 9, 11, and 22, Totteridge-rd., u.t. 79 yrs., g.r. 24*l.* 1,060
1, 7, and 23, Urswicke-rd., u.t. 79 yrs., g.r. 12*l.*. 535
Wandsworth.—9 and 11, Pembridge-villas, u.t. 66 yrs., g.r. 16*l.* 16s., r. 40*l.* 245
Tooting.—2, Cumberland-villas, u.t. 66 yrs., g.r. 4*l.* 15s. 60
7 and 8, Arnold-rd., u.t. 64 yrs., g.r. 12*l.* 10s., r. 44*l.* 330
6, Aldis-ter., u.t. 69 yrs., g.r. 7*l.*, r. 20*l.* 100
Battersea.—47 and 48, Simpson-st., u.t. 56 yrs., g.r. 10*l.* 10s. 320
12, Ashurst-st., u.t. 64 yrs., g.r. 5*l.*, r. 28*l.* 240
19, 21, 23, 25, 36, 38, 40, and 50, Yelverton-rd., u.t. 79 yrs., g r. 28*l.* 1,680
35, 37, and 39, Harrowby-rd., u.t. 79 yrs., g.r. 10*l.* 10s. 600

March 23.—By DOUGLAS YOUNG & CO.

City of London.—Old Bailey, "The Bell" p.-h., f., r. 300*l.*, including a one-third share in Prujean-sq. 13,300
Muswell Hill.—Fortis Green-rd., a freehold building estate, area 17¼ a. 17,600
Camberwell.—1 and 3, Rignold-rd., u.t. 69 yrs., g.r. 10*l.* 10s. 450

By HAMILTON & MIALL.

West Kensington.—113, Shepherd's Bush-rd., u.t. 80 yrs., g.r. 14*l.*, r. 45*l.* 410
Kensal Rise.—5 and 7, Greyhound-rd., u.t. 88 yrs., g.r. 10*l.* 310
Shepherd's Bush.—6 and 8, Vespan-rd., u.t. 65 yrs., g.r. 12*l.* 12s. 430

By F. S. PRIEST.

Harlesden.—9, Nicoll-rd., u.t. 74 yrs., g.r. 8*l.*, e.r. 55*l.* 510
37, 39, 41, and 43, Fortune Gate-rd., u.t. 91 yrs., g.r. 24*l.* 910
Paddington.—2, College Park-villas, u.t. 80½ yrs., g.r. 7*l.* 10s., e.r. 30*l.* 280

By E. W. RICHARDSON & SON.

Forest Hill.—Brockley Park, &c., four plots of building land, f. 545
Walworth.—Finchley-rd., &c., i.g.r. 123*l.*, u.t. 52 yrs., g.r. 79*l.* 12s. 6d. 800

By H. ROW.

Bayswater.—47, Queensbury-ter., u.t. 64 yrs., g.r. 35*l.*, e.r. 150*l.* 800

By T. N. TURNER.

Bayswater.—72, Ledbury-rd., u.t. 48 yrs., g.r. 8*l.* 8s., r. 46*l.* 375
Hyde Park.—4, 5, and 6, Portsea-pl., u.t. 19 yrs., g.r. 24*l.*, e.r. 160*l.* 1,350
Marylebone.—11, Seymour-pl., u.t. 30 yrs., g.r. 22*l.*, r. 70*l.* 600

By F. J. BISLEY & SONS.

Bermondsey.—28 and 30, Cherry Garden-st., f., r. 141*l.* 4s. 1,100
12, 14, and 16, Alma-rd., u.t. 26 yrs., g.r. 10*l.* 10s. 625
3, Catling-st., u.t. 48 yrs., g.r. 5*l.* 280
33, Catling-st., u.t. 49 yrs., g.r. 5*l.* 285
6, 8, 10, and 12, Jamaica-rd., u.t. 32 yrs., g.r. 18*l.* 12s. 1,400
Peckham.—25, Willowbrook-rd., u.t. 22 yrs., g.r. 4*l.* 130

By THURGOOD & MARTIN.

Camberwell.—1, Hazelmere-rd., u.t. 66 yrs., g.r. 7*l.* r. 28*l.* 205
Gray's Inn-rd.—34, Calthorpe-st., u.t. 44 yrs , g.r. 6*l.*, r. 55*l.* 510
Wimbledon.—King's-rd., three plots of building land, f. 395
Prince's-rd., &c., a corner block of building land, f. 610
Queen's-rd., &c., a block of land, 4 a. 2 r. 4 p., f. 6,200
Trinity-rd., &c., a block of land, 11 a. 0 r. 19 p , f. 13,500

By HEPPER & SONS (at Leeds).

Leeds.—Harehills-lane, "Harehills House" and 9 a. 1 r. 11 p., f. 10,050
Devon-rd., three building sites, with house and shop, area 16,324 yards, f. 5,803
Great George-st., five plots of building land, area 3,936 yds., f. 21,882

By H. HOLYOAK & SON (at Luton).

Luton, Beds.—Chapel-st., 16 plots of building land, f. 5,310
Stuart-st., eight plots of building land, f. 815
Chapel-st., "Stuart Lodge" and 2 r. 10 p.. f. ... 1,210

By RENDELL & SYMONDS (at Totnes).

South Brent, Devon.—"Charford Estate," 129 a., f. £6,010

By W. J. PEIRCE & THORPE (at Astcote).

Astcote, Northants.—A freehold farm, area 36 a. 1 r. 5 p. 1,200

March 24.—By DANIEL WATNEY & SONS.

South Kensington.—20, Bramham-gdns., u.t. 86½ yrs., g.r., &c., 9*l.* 4s., e.r. 200*l.* 2,500
St. Luke's.—58 and 60, Pear Tree-st., area 2,000 ft., f., r. 50*l.* 1,140
Holloway.—Brunswick-rd., f.g.r. 48*l.*, reversion in 46 yrs. 1,435
Balham.—191, Balham High-rd., f., r. 110*l.* 1,700

By G. BILLINGS.

Whitechapel.—25A, Commercial-rd., u.t. 24½ yrs., g.r. 40*l.*, r. 100*l.* 540
Tottenham.—High-rd., "Stoneleigh," f., r. 90*l.*, and plot of land in rear, f. 2,270

By CHESTERTON & SONS.

Barnes.—The Crescent, a plot of building land, f.. 1,470
The Avenue, a plot of building land, f. 1,600

By FAREBROTHER, ELLIS, & CO.

Pinner, Middlesex.—Love-lane, "Nascot," and 1 r. 36 p., f., r. 70*l.* 1,250

By FLICK & SON.

Hanwell.—"The Broadway Stores," c., r. 42*l.* 710
The Broadway, "Holly House," c., r. 35*l.* 820
Chiswick.—5, 7, 7A, 9, 11, and 13, Essex-pl., c., r. 91*l.* 13s. 430

By C. C. & T. MOORE.

Mile End.—9, Redman's-rd., f., r. 78*l.* 655
Poplar.—14 and 16, Canton-st., u.t. 32 yrs., g.r. 8*l.*, r. 56*l.* 430

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.

PRICES CURRENT OF MATERIALS.

TIMBER.		
Greenheart, B.G. ton	8/0/0	0/0/0
Teak, E I....load	9/0/0	14/-/0
Sequoia, U.S.ft.cu.	1/8	1/10
Ash, Canada, load	2/17/6	4/2/6
Birch, do.	2/17/6	4/10/0
Elm, do.	3/12/6	4/12/6
Fir, Dantsic, &c..	1/11/0	3/11/0
Oak, do.	2/4/0	3/4/0
Canada	3/15/0	5/0/0
Pine, Canada red	c/0/0	0/0/0
Do. yellow	2/5/0	4/5/0
Lath, Dantsic, fath	4/10/0	5/10/-
St. Petersburg..	5/0/0	6/10/0
Wainscot, Riga, &c., log	3/12/6	5/10/0
Odessa, crown....	3/12/6	5/10/0
Deals, Finland 2nd & 1st std 100	7/15/0	8/5/0
Do. 4th & 3rd ..	7/15/0	8/5/0
Do. Riga	6/5/0	7/5/0
St. Petersburg, 1st yellow	9/15/0	12/5/0
Do. 2nd yellow.	8/15/0	10/5/0
Do. white	8/5/0	10/5/0
Swedish	8/15/0	15/5/0
White Sea	9/5/0	25/15/0
Canada, Pine 1st	19/5/0	25/5/0
Do. do. 2nd	13/15/0	16/5/0
Do. do. 3rd, &c.	6/5/0	9/15/0
Do. Spruce, 1st	10/0/0	11/10/0
Do. do. 3rd and 2nd	7/10/0	8/10/0
New Brunswick	7/c/0	7/1r/0
Battens all kinds	5/0/0	18/0/0
boards, sq., 1 in. prep. 1st.....	9/6/0	17/0/0
Do. 2nd	8/0/0	13/6/0
Other qualities—	6/6/0	7/6/0
Cedar, Cuba, ft.	/4	/4½
Honduras, &c.	/3¾	/4½
Mahogany, Cuba	/5	/6½
St. Domingo, cargo av.	/4¾	0/1/3
Mexican, do. do.	/3¾	/4
Tobasco, do. do.	/4	6½
Honduras, do.	/4¾	/6
Box, Turkey, ton	4/c/0	15/e/0
Rose, Rio	7/c/0	14/0/0
Bahia	6/0 0	12/0/0
Satin, St. Doming.	0/0/5	0/1/0

TIMBER *(continued)*.		
Satin, Porto Rico	0/0/6	c/1/6
Walnut, Italian ..	0/-/3	c/0/7
METALS.		
Iron—Pig, in Scotland .....ton	2/6/1½	2/6/4½
Bar, Welsh, in London	5/15/0	5/17/6
Do. do. at works in Wales	5/10/0	5/12/6
Do. Staffordshire, in London.....	6/5/0	7/10/0
COPPER — British cake and ingot	54/15/0	55/5/0
Best selected ..	55/5/0	55/15/0
Sheets, strong..	59/10/0	60/-/0
Chili bars	50/13/9	0/0/0
YELLOW MTL lb.	5d.	5½d.
LEAD — Pig		
Spanish ....ton	13/0/0	c/c/0
English com. bands	13/5/0	c/0/0
Sheet, English 6 lbs. per sq. ft. and upwards ..	14/5/0	c/0/0
Pipe.....	14/15/0	0/0/0
ZINC — English sheet.....ton	20/5/0	0/c/0
Vieille Montagne	21/10/0	0/0/0
Spelter	18/8/9	18/10/0
TIN—Straits	65/c/0	0/0/0
Australian.....	65/10/0	66/0/0
English Ingots..	67/15/0	68/15/0
Banca	61/0/0	0/0/0
Billiton	59/15/0	60/c/0
OILS.		
Linseed .....ton	15/15/0	0/0/0
Cocoanut, Cochin	27/15/0	c/0/0
Do. Ceylon.....	22/0/0	0/0/0
Palm, Lagos	21/15/0	0/0/0
Rapeseed, English pale	27/10/0	0/c/0
Do. Brown	26/0/0	c/0/0
Cottonseed ref.....	14/5/0	15/5/0
Oleine.....	13/10/0	14/10/0
Lubricating U.S.	0/5/3	0/7/6
Do. Black	0/5/0	0/6/6
TAR — Stockholm barrel	1/0/0	0/c/0
Archangel	0/12/6	0/-/0
Turpentine	24/-/0	0 c/0

TENDERS.

*** Next week communications for insertion under this heading must reach us *not later than 10 a.m.* on Wednesday, as, owing to the Easter holidays, we go to press a day earlier than usual.

ASHFORD (Middlesex).—For erecting house, for Mr. Chas. Sale. Mr. H. W. Smith, architect, 19, Tremlett-grove, Junction-road:—

Collinson	£895	Robinson & Francis	£745
Brown	847	Trust	730
Speechley & Smith	769		

BANGOR (Wales).—For the erection of Friars School, for the Governors. Messrs. Douglas & Minshull, architects, 6, Abbey-square, Chester:—

E. Williams	£17,435 11 0	R. J. Williams	£10,665 15 11
Jones & Williams..	10,718 15 0	E. Jones	10,038 19 0
W. Jones	10,547 0 0	G. Woods & Son..	9 8.0 0 0
W. Parry	10.394 0 0	J. Mayers	9,500 0 0
T. Browne	10,163 8 6	J. Hamilton & Son, Altrincham*	8,8.8 0 0
S. Parry & Sons ..	10,154 0 0		

* Accepted with modifications.

BATH.—For the enlargement of Oak-street schools, for the School Board. Mr. W. J. Willcox, architect, Belmont, Bath:—

		Extra for Brick Dado.
W. Webb	£5 735 0	£233
C. Wibley	5.557 10	338
E. Chancellor	5.462 0	340
Hayward & Wooster	5.347 0	439
Long & Sons	5.383 0	397

[All of Bath.

BEDLINGTON.—For the execution of sewerage works, for the Urban District Council. Mr. C. Brown, Surveyor, Bedlington. Quantities by Surveyor:—

Tough Bros	£343 15 0	John Thompson, Newcastle*	£258 1 6
Jacob Robson	278 14 6		

* Accepted.

COMPETITION, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITION.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered.
*Offices, Library Institute, Fire Station, and Public Baths	East Ham U.D.C.	100 guineas and 50 Guineas	June 24

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c. Supplied by	Tenders to be delivered.
Congregational Church, St. Paul's, Cowbridge-road, Cardiff	Rev. J. H. Walker	Wall & Sant, Archt. Cardiff	April 5
Alterations at Workhouse	Newton Abbot Union	S. Segar, Archt. Union-st. Newton Abbot	do
Reservoir and Cast Iron Pipe Laying	Newton Abbot R.D.C.	do.	do.
Three Shelters, Marine Parade	Southend Corp.	A. Fidler, C.E. Boro. Engr. Southend	do.
Four Cottages, Hardwicke-road, Maxton, Kent	E. Dawes	W. J. Jennings, Archt. Canterbury	do.
Draining, Paving, &c. Crookes-street	Barnsley T.C.	J. H. Taylor, C. E. St. Mary's-place, Barnsley	April 6
Surgery and Four Houses, Warsbro' Bridge, Barnsley	———	H. Crawshaw, Archt. 13, Regent-st. Barnsley	do.
Police Station, Court House, &c. Newton-le-Willows	Lancs. C.C	H. Littler, Archt. 68, Fishergate, Preston	do.
*Making-up, &c. Wolsley-gardens	Chiswick U.D.C.	A. Ramsden, Vestry Hall, Chiswick	do
Memorial Schools, Wadebridge	———	Kerley & Ellis, Archt. Exmouth	do.
Seven Houses, Savile Estate, Dewsbury	———	Utley & Co. Archt. 10, Waterhouse-st. Halifax	do.
School, Chapel, &c. Old Town, Eastbourne	———	Mr. Crisford, Archt. Eastbourne	do.
Slaughter House	Bideford T.C.	R. T. Hookway, Archt. Bridgeland-st. Bideford	do.
Alterations to Post Office, St. Mary-st.	Cardiff Corp.	W. Harpur, C.E. Town Hall	do.
Twelve Houses, West Bowling	———	Rycroft & Firth, Archts Manchester-rd. Bradford	April 7
*Drainage of Churchyard	Shoreditch Vestry	Surveyor, Town Hall, Old-street, E.C.	do.
*Vagrant Wards	Hendon Union	F. J. Seabrook, Union Offices, Edgware, Middlesex	do.
*Pianoforte Factories, Upper Holloway	London Piano & Organ Co.	A. Tosh, 120, Cheapside, E.C.	do.
Alterations, &c. "Sea Horse" Hotel, Colchester	Colchester Brewery Co. Ltd.	G. H. Page, Archt. Trinity-chmbrs. Colchester	April 8
Stores, Bradford	Great Horton Indus. Soc.	J. Drake & Sons, Archts. Queensbury	do.
Farm Buildings, Sawrey	———	J. Banks, Agent, Kendal	April 9
Club House, Beckford-road, Cowes	Conservative Club Committee	J. Yeates, 12, High-street, Cowes	April 10
Additions to Hall, Dalton-in-Furness	Co.-op. Soc.	J. Butler, Archt, 34, Cornwallis-st. Barrow	April 11
Sewerage Works, Back Market-st. &c.	Church (Lancs.) U.D.C.	Surveyor, Council's Offices, Church	do.
House at School	Burham (Kent) Sch. Bd.	H. Benstead, Archt. Maidstone	do.
Offices, Cork-street, Cork	J. McCarthy & Sons	W. H. Hill & Son, Archts. 28, South Mall, Cork	do.
*Ballast Bins	St. James' Westminster Vestry	T. H. Munsey, Vestry Hall, Piccadilly, W.	April 12
*Road Materials	Bromley U.D.C.	Council Offices	do.
Paving, Flagging, Sewering, &c Several Streets	Rishton (Lancs.) U.D.C.	J. J. Adams, 62, High-st. Bolton	April 13
Ragstone, &c. Rochester	Commissioners, &c. of Sewers, Gravesend	E. L. Baker, Clerk to the Commission, Rochester	do.
*Teacher's Residence	High Ongar, S.B.	R. Mawhood, Archt. Chelmsford	do.
*Technical Workshops (at Schools)	Hackney Union	F. E. Coles, Union Offices, Homerton, N.E.	do.
House, Coldbrook, Abergavenny	———	B. J. Francis, Archt. Abergavenny	do.
Laundry at Workhouse	Farnham Union	Friend & Lloyd, Archt. Grosvenor-rd. Aldershot	do.
Locomotive and Carriage Shops, Invernrie	G. N. of Scotland Ry. Co.	W. Moffatt, Station, Aberdeen	April 15

CONTRACTS—*Continued.*

Nature of Work or Materials.	By whom Required.	Forms of Tender, &c. Supplied by	Tenders to be delivered
Police Station, Broughton, near Preston	Standing Joint Committee	H. Littler, Archt. 68, Fishergate, Preston	April 16
*Cast-Iron Sewer Ventilating Columns, &c.	Beckenham U.D C.	J. A. Angell, Council Offices	April 18
*Bakery, Flour Store, and Shop	New Brompton Economical Society, &c.	E. J. Hammond. 111, High-street, New Brompton, Kent	do.
*Widening, Kerbing, Paving, Channelling, &c.	Hornsey U.D.C.	E. J. Lovegrove, Council Offices, Southwood-lane, Highgate, N.	do.
*Wrought Iron Fencing, Gates, &c. (Supply and Erection)	do.	do.	do.
*Post and Inland Revenue Office, Sunderland	Commrs. H.M. Works	Offices, 12, Whitehall-place, S.W.	April 19
*Paving and Making-up Roads, &c.	Acton D.C.	D. J. Ebbetts, 242, High-street, Acton, W.	do.
New Road, Talmin Harbour	Sutherland C.C.	A. Argo, County Offices, Golspie, N.B.	April 20
*Pipe Sewer	Fulham Vestry	C. Botterill, Town Hall, Walham Green	do.
*Sewage Disposal Works	Ilford U.D.C.	Taylor, Sons, & Crimp, 27, Gt. George-street, S.W.	April 21
Fire and Police Station	Sheffield Corp.	J. Norton, Archt. George-street, Sheffield	April 22
Road Works	Sutherland C.C.	A. Argo, County Offices, Golspie, N.B.	April 25
*Dredging between Maidenhead and Windsor	Thames Conservancy	Engr. at Offices, Victoria Embankment, E.C.	April 26
*School Buildings, Farm Buildings, Dairy, and Workshops	Governors. Harper Adams Foundation	H. Teather, Andrews-bldgs. Queen-street, Cardiff	April 28
*Steel Bridge (Three Spans of 58ft. each)	Sheffield Corp.	C. F. Wike, Town Hall	April 30
Infirmary and Workhouse Block	Rotherham Union	H. L. Tacon, Archt. 11, Westgate, Rotherham	No date
Two Semi-detached Villas, Balmoral, Belfast	———	A. Crawford & Son, 8 and 10, Arthur-street, Belfast	do.
*Hotel, Caversham	———	G. W. Webb, Archt. Market-place-chmbrs. Reading	do.
Parish Rooms, St. Mary's, Wigton	———	G. Watson & Son, Archt. 3, St. Andrew's-pl. Penrith	do.
Bank Premises, Llandrindod Wells	London and Provincial Bank, Ltd.	Wilson & Moxham, Archt. 15, Castle-street, Swansea	do.
Schools, St. Peter's, North Walls, Winchester	———	Colson & Co. Archt. 45, Jewry-street. Winchester	do.
Twelve Houses, Blaydon-on-Tyne	Co-op. Soc.	Mr. Allen, Archt. 16, Ryton Village East, Ryton-on-Tyne	do.
Three Shops, Belle Vue-street, Filey, Yorks.	———	Smith & Tweedale, Archt. 12, South-parade, Leeds	do.
School, Jubilee-terrace, Woodhouse	Leeds Sch. Bd.	W. T. Braithwaite, Sch. Bd. Offices, Leeds	do.
Eight Houses, Avenel-terrace, Allerton	———	R. Drake, Archt. 142, Allerton-road, Allerton	do.
Eight Houses, Whingate, Armley, Leeds	———	F. W. Rhodes, Archt. Upper Wortley, Leeds	do.
Fourteen Houses, Ashton-under-Lyne	———	T. D. Lindley, Archt. Market-avenue, Ashton-under-Lyne	do.
Two Villas, Pollard-lane, Bradford	———	F. Wild, Archt. 7, Charles-street, Bradford	do.
*Painting, &c. at York and Sheffield	War Department	R. E. Office, Fishergate, York	do.
*Joiner's and Machine Shops	R. & W. Hawthorn Leslie & Co. Ltd.	Co.'s Offices, Shipyard, Hebburn-on-Tyne, Newcastle	do.
*Reconstruction of Drainage at Asylum	Sunderland Boro' Asylum	J. Little, Viaduct-chmbrs. Carlisle	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Application to be in.
*Surveyor's Temporary Assistant	Southport Corp.	2l. 10s. per week	April 5
*Temporary Draughtsman	Hackney Vestry	2l. 5s. per week	do.
*Borough Surveyor's Assistant	Tunbridge Wells Corp.	3l. per week	April 9
*Surveyor	Stoke Newington Vestry	Commence at 300l. per annum	No date

Those marked with an asterisk (*) are advertised in this Number. *Competitions, p.* iv. *Contracts, pp.* iv. vi. & viii. *Public Appointments, pp.* xvii. & xix.

BEWCASTLE (Cumberland).—For the erection of three stone bridges, for the Longtown Rural District Council. Mr. Geo. Jos. Bell, County Surveyor, The Courts, Carlisle :—

John Scott & Sons, Newcastleton, N.B.		£696	4 6
	Crookburnfoot Bridge	£218	2 6
	Routledge Burn Bridge	229	17 0
	Cuddies Ha' Bridge	258	5 0
Thomas Telfer, Langholm, N.B.		722	16 6
	Crookburnfoot Bridge	211	16 6
	Routledge Burn Bridge	261	0 0
	Cuddies Ha' Bridge	230	0 0

[Surveyor's estimate, £702.]

BEXHILL.—For erecting a new scholastic residence, Bexhill-on-Sea, for the Rev. F. Burrows, Ancaster House, St. Leonard's-on-Sea. Messrs. Jeffrey & Skiller, architects, Hastings :—

M. Martin	£4,650	P. Jenkins	£4,300
Eldridge & Cruttenden	4,436	Padgham & Hutchinson	4,280
J. Lester	4,397	J. Simmons & Co.	4,232
H. E. Cruttenden	4,368	A. H. White, St. Leonards*	4,186

* Amended and accepted.

BIGGLESWADE.—For making footways within the district, for the Urban District Council. Mr. J. O. Jones. Surveyor, District Council Offices, Biggleswade :—

J. D. Ruffell	£1,426	A. Henman	£1,159 17 7
The Patent Victoria Stone Company	1,223 6 3	R. Black	—*
— Catley	1,197 0 0	Croft Company	—*

* Schedule prices.

No tender accepted. Council decided to do the work themselves. Surveyor's estimate of cost, £1,036 0s. 6d.

BLYTH (Northumberland).—For the execution of street works Wellington-street, &c., for the Cowpen Urban District Council. Mr. R. Grieves, Surveyor, Seaforth-street, Waterloo, Blyth :—

Contract No. 1.—Making up Streets (Wellington-street, &c.), Cowpen Quay, Blyth.

M. D. Young	£1,884 16 6
J. Robson	1,828 7 0
G. E. Simpson, Newcastle-on-Tyne (accepted)	1,748 7 0

Contract No. 2.—Making up Streets at Cowpen Village and Cowpen New Town, Blyth.

M. D. Young	£999 4 1
J. Robson	998 19 3
G. E. Simpson, Newcastle-on-Tyne (accepted)	915 14 3

BICKLEY (Kent).—For repairs to "Woodlands." Mr. R. Mawhood, architect, Chelmsford :—

D. Payne, Bromley	£294

For conservatory.

Beckett Bros., Chelmsford	£280

BOSTON (Lincolnshire).—For the erection of offices, wine, spirit, and beer stores, stables, shed, cottages, &c., for Messrs. Soulby, Sons, & Winch. Mr. Jas. Rowell, architect, Boston, Lincolnshire :—

S. Sherwin	£2,487	Chas. Jessop	£2,040
Wadsley & Co.	2,486	John Lucas, Boston*	1,970
H. W. Parker	2,199		

* Accepted.

[Architect's estimate, £2,400.]

BOURNE (Lincs).—For the supply of broken granite road metal, for the Rural District Council :—

Ellis & Everard, Bardon Hill Quarries	£0 5 3*	
	0 5 9*	
[Accepted for 4,855 tons.]		
Groby Granite Company, near Leicester	0 4 9*	
	0 5 0*	
[Accepted for 4,823 tons.]		
Holwell Iron Company, Asfordly	0 2 3†	
[Accepted for 600 tons.]		

* Granite at quarry. † On trucks at Holwell Junction.

BOURNEMOUTH.—For the erection of a new residence, for the Misses Swaisland, at Southbourne-on-Sea. Mr. G. A. Bligh Livesay, architect. Quantities by Messrs. Jennings & Goater :—

W. Hoare	£2,336	Jenkins & Sons	£2,210
George & Harding	2,320	Jones & Sons	2,198
F. Hoare & Sons	2,297	McWilliam & Son*	2,178

* Accepted, subject to modification.

BRANDON (Durham).—For the supply of road materials, for the Urban District Council. Mr. R. Gardner, surveyor, Langley Moor, near Durham :—

	Per Ton. s. d.
Strakers & Love	7 4
W. Barker & Co.	3 4
Ord & Maddison	5 4
"	5 8

BRIGHTON.—For the erection of a block of buildings for children at the workhouse, for the Union Guardians. Mr. H. S. Reed, architect, Parochial Offices, Prince's-street, Brighton :—

R. Cook & Sons	£18,569	Peters & Son	£14,595
Sattin & Evershed	15,368	J. J. G. Saunders & Sons. Ivory-place, Brighton*	14,475
W. Brown & Son	15,113		
Jay Bros.	14,920		

* Accepted.

BROADSTAIRS (Kent).—For the execution of sewerage works, for the Urban District Council. Messrs. Law & Son, engineers, 17, Victoria-street, Westminster, S.W. :—

Pedrette & Co.	£23,711 13 7	B. Cooke & Co.	£18,824 0 0
W. H. Saunders & Co.	19244 0 0	A. Kellett	16,600 0 0
		G. Bell	16,573 0 0

CHIGNAL ST. JAMES (Essex).—For three pairs of cottages. Mr. R. Mawhood, architect, Chelmsford :—

J. Gowers, Chelmsford, per pair	£275

CHISWICK.—For completing the building of No. 74, St. Mary's-grove, Chiswick. Mr. J. H. Willis, architect, 18, Dagmar-road, Camberwell :—

W. J. Pratt	£210	Bolill Bros.	£145
Blackburn	196	L. L. Leeder & Co., Chiswick (accepted)	149
H. Line	159		

DARTFORD.—For workhouse extensions, West Hill, for the Union Guardians. Mr. G. H. Tait, C.E., Lowfield-street, Dartford. Quantities by Mr. A. R. Brede, Gray's-inn-road :—

Gunning	£21,220	Knight, Sidcup*	£18,245
Thomas & Edge	18,245		

* Accepted.

EXMOUTH.—For rebuilding premises, Chapel-street, Exmouth, for Mr. W. H. Penwarden. Messrs. Kerley & Ellis, architects, Exmouth and Salterton :—

J. J. Lacey	£683 0	W. H. Perry	£595 0
R. B. Ponsford	649 0	A. Hayman*	439 3
H. Dart	585 0		

* Accepted.

[All of Exmouth.

EXMOUTH.—For the erection of detached villa on the Halsdon Estate, Exmouth. Messrs. Kerley & Ellis, architects, Exmouth and Salterton :—

A. Hayman	£1,314 18	H. Dart, Exmouth*	£1,259 0

* Accepted.

FINDHORN (N.B.).—For the erection of a villa residence, for Mr. Robert Stewart, Edinburgh. Mr. J. Forrest, architect, 129, High-street, Forres:—

Masonry.—J. Mackenzie, St. Leonard's-road, Forres
Carpentry.—R. Smith, Cumming-street, Forres
Slating.—A. Forbes, Tytler-street, Forres
Plastering.—Angus & Ross, South-street, Forres
Plumbing.—W. Munro, Urquhart-street, Forres
Painting.—J. Robertson, Urquhart-street, Forres
Railings.—Youngson & Son, Lossie Wynd, Elgin
Grates.—W. Smith & Son, High-street, Forres
} £695

FOREST HILL.—For decorative work and general repairs to 65 and 67, St. Germain's-road, Forest Hill. Messrs. Cooper & Goulding, architects:—

Weeks	£236	Walker	£218
E. Houghton & Son	232	Brown	214

FROME.—For taking down railway tavern and cottages and erecting an hotel and offices, Wallbridge, for the Lamb Brewery, Limited. Mr. W. G. Brown, architect, Park-road, Frome. Quantities not supplied:—

Charles Barnes	£1,655	John Hibberd, Frome*	£1,631

* Accepted.

GOSFORTH.—For the execution of paving works, &c., for the Urban District Council. Mr. C. J. Baff, surveyor, Council Chambers, Gosforth:—

	Kerbing.	Taking up, re-dressing, and relaying kerbs.	Asphalt.	Whinstone crossings.
Surveyor's estimate	224 5 7	77 0 0	573 1 4	127 15 0
Faldo	—	—	2,542 19 8	—
North of England Asphalt Company	—	—	787 19 4	—
Hatfield, Sheffield, and Sunderland*	—	—	573 1 4	—
Young	293 18 6	115 10 0	—	138 7 3
Simpson, Newcastle-on-Tyne	197 5 7*	64 3 4*	646 14 0	120 3 6*

* Accepted.

GRAYS (Essex).—For the erection of four houses at South Ockenden, for Mr. Webster. Mr. Christopher M. Shiner, architect, 2, Walbrook, E.C.:—

H. R. Rons	£1,424	J. Lawrence	£985
G. B. Rons	1,400	Davey	984
J. Brown	1,040		

GRAYS (Essex).—For the erection of a house on Palmer's-avenue, for Mr. Alfred Brooks. Mr. Christopher M. Shiner, architect, 2, Walbrook, E.C.:—

J. Lawrence	£925	H. R. Rons	£850
J. Brown	898	H. J. Carter	825

HASTINGS.—Accepted for the erection of retaining walls, &c., High Bank, Ore, for the Corporation. Mr. P. H. Palmer, C.E., Town Hall, Hastings:—

H. J. Smale, North-road, Ore £475

HEXHAM.—For the execution of public and private street works, for the Urban District Council. Mr. R. T. Surtees, Surveyor, Priestpopple, Hexham:—

Geo. E. Simpson	£1,292	M. D. Young, Elm-grove, Hexham (accepted)	£1,022
Jacob Robson	1,272		

[Surveyor's estimate, £1,258.]

ILFORD.—For the erection of two villas, Oakfield-road, Ilford. Mr. Fredk. G. Faunch, architect:—

Welsh & Son	£1,340 0	Snewin Bros. & Co.	£1,080 0
C. North	1,239 0	Lewin	879 10
Willmott	1,124 0		

ILKLEY.—For the erection of a block of shops and offices, for Mr. Jackson. Messrs. Isitt, Adkin, & Hill, architects, Prudential-buildings, Bradford:—

Masonry.—M. D. Featherstone, Wells-road, Ilkley	£2,990 0 0
Joinery.—Lorthill & Balmforth, Little Horton, Bradford	1,387 1 7½
Plumbing.—M. Houldsworth, Cunliffe-road, Ilkley	418 11 0
Slating.—Wm. Atkinson, Kirkstall-road, Leeds	226 18 0
Plastering.—O. Lister, Poplar-grove, Ilkley	542 0 0
Painting.—G. J. Walton, Great Horton-road, Bradford	49 0 0
Shop-front Fitting.—Carr Bros., Ltd., Snowden-street, Bradford	640 0 0

INGATESTONE (Essex).—For shop front and repairs to premises. Mr. R. Mawhood, architect. Chelmsford:—

W. Fincham	£553	Smith & Son, Witham*	£512
H. Potter	515		

*Accepted.

IPSWICH.—For additions to schools, Wherstead-road, for the School Board. Mr. Thos. Wm. Cotman, architect, Northgate-street, Ipswich. Quantities by Mr. J. Sidney Parmenter, Ipswich:—

M. Death	£2,226	C. Roper	£1,798
F. Bennett	1,935	R. Girling	1,752
Grimwood & Sons	1,896	Parkington & Son	1,666
C. Borrett	1,882	S. Kenney	1,638
G. Kenney	1,855	G. Sadler (withdrawn)	1,570
W. Grayston	1,816	A. Gayford (withdrawn)	1,454

All of Ipswich.

LEIGH (Essex).—For the erection of two class-rooms to accommodate 120 children, and cloak-rooms, &c., at the Boys' and Girls' Schools, Leigh-on-Sea, for the Leigh School Board. Mr. Frank E. Smee, architect, 12, West Smithfield, E.C. Quantities by Mr. J. E. Goodchild, 81, Finsbury-pavement, E.C.:—

Hammond & Son	£1,797	Thorpe & Son, Leigh*	£1,619
West	1,750	Bullock & Patten	1,444
Symes	1,730	* Accepted.	

[Architect's estimate, £1,650.]

LEYTON.—For the erection of six houses, Vicarage-road, Leyton. Mr. A. L. Pridmore, architect:—

Cakpen	£3,940	Barker	£2,955
Fuller & Son	3,360	Snewin Bros. & Co.	2,850
Downs Bros.	3,200	Sizer	2,793

LLANTRISANT.—For the execution of sewerage works, Tonyrefail for the Rural District Council of Llantrisant and Llantwit Fardre. Mr. G. S. Morgan, surveyor, Pontyclun. Quantities by surveyor:—

S. Evans	£212 4 6	E. H. Page	£186 19 6
W. Farquharson	198 5 8	J. Woods	170 0 0
Batchelor & Snowden	194 12 9	Barnes, Chanlin, & Co.	167 0 0
J. Morgan	194 3 3	T. Davies, Pontyclun*	165 13 0
R. Jones	189 0 0	* Accepted.	

LONDON.—For decorative and other works to No. 7, Park-crescent, W., for Mr. Charles Burge. Mr. Walter J. Ebbets, architect and surveyor, Savoy House, 115, Strand, W.C.:—

R. A. Yerbury & Sons	£1,684 0	Bywaters & Son	£1,130 0
Maple & Co., Ltd.	1,235 10	J. M. Macey & Son	1,066 0
J. Macintosh	1,227 0	Campbell Smith & Co.	898 0

LONDON.—For erecting bath and discharge rooms at Isolation Hospital, Muswell Hill, for the Hornsey Urban District Council. Mr. E. J. Lovegrove, Engineer and Surveyor:—

F. Cottrell	£1,483	Gough & Co.	£1,134
Willmott & Sons	1,295	Houghton & Son, Stroud Green (accepted)	1,119
McCormick & Sons	1,288		

[Surveyor's estimate, £1,100.]

LONDON.—For erecting a two-storied factory, and offices on Wharf "B," Windmill-lane, for the Atlas Preservative Company. Messrs. Bradshaw, Brown & Co., architects and surveyors:—

		Work to be completed in
T. Boyce	£1,375	12 weeks.
A. Porter	1,360	17 "
Chaten & Newman (accepted)	1,340	19 "

LONDON.—For storm-water culvert, Pembroke-road, Hornsey, for the Hornsey Urban District Council. Mr. E. J. Lovegrove, Engineer and Surveyor:—

C. Ford	£2,894	J. A. Dunmore	£2,457
Jackson & Son, Ltd.	2,567	W. Walker	2,444
Pedrette & Co.	2,551	Geo. Bell	2,430
Williamson & Sons, Ltd.	2,529	T. Adams, Green Lanes*	2,397
Neave & Son	2,479		

[Surveyor's estimate, £2,200.]
* Accepted.

LONDON.—For surface water sewers in Tottenham-lane and High-street, Hornsey, for the Hornsey Urban District Council. Mr. E. J. Lovegrove, Engineer and Surveyor:—

W. Walker	£2,736	J. A. Dunmore	£2,249
Williamson & Sons, Lim.	2,659	Jackson & Son, Lim.	2,237
Pedretto & Co.	2,639	T. Adams, Green Lanes*	2,211
Neave & Son	2,425	C. Ford	2,106
G. Bell	2,263	* Accepted.	

[Surveyor's estimate, £2,206.]

LONDON.—Accepted for extension of premises, Old Ford-road, for Messrs. Knight & Co. Messrs. Holman & Goodsham, architects:—

C. Yates & Co. £950

LONDON.—Accepted for new stables, offices, and oil-tanks, Old Ford-road, for Messrs. J. Kidd & Co. Messrs. Thurgood & Martin, architects:—

C. Yates & Co. £1,450

LONDON.—For new furnaces and tubes to the ss. *Barking*, for the London County Council:—

	Furnaces.	Tubes.	Total, including provision money.
The Thames Ironworks, &c., Company, Limited	£1,005 0	£253 0	£1,308
Brown's Dry Docks, &c., Company, Limited	796 10	249 13	1,096
A. W. Robertson & Co.	643 0	365 0	1,055
Fletcher, Son, & Fearnall, Limited	756 0	227 0	1,033

LONDON.—For repairs to the s.s. *Burns*, for the London County Council:—

Thames Ironworks, &c., Co., Ltd.	£355 0	Fletcher, Son, & Fearnall Ltd	£272 10
A. W. Robertson & Co.	326 0	Mills & Knight	270 18
London Graving Dock Co., Ltd.	322 0	Deptford Dry Docks Co., Ltd.*	250 7
Brown's Dry Dock, &c., Co., Ltd.	305 15	* Accepted.	

LONDON.—For the erection of a block of flats on the site of Nos. 18 and 20, Havil-street, Camberwell, for Mr. J. Van-den-Bergh. Mr. T. Wilson, architect, 34, New Bridge-street, E.C.:—

Barker	£3,361	Coleman	£2,894
Roberts	3,209	Wale & Co.	2,884
Chessum	3,297	L. Whitehead & Co., Ltd.	2,845

LONDON.—For alterations to the "Prince of Wales" public-house, Prince of Wales-road, N.W., for Mrs. Gibbs. Messrs. Lewcock & Callcott, architects, 88, Bishopsgate-street Within:—

Maple & Co.	£2,750	Goadey	£1,967
Bertram	2,520	Green & Smith	1,898
Marchant & Hirst	2,145		

LONDON.—For reconstruction of premises, Pratt's-row, Homerton. Mr. John Hamilton, architect:—

Beale	£839	Snewin Bros. & Co.	£685
Silk & Son	750	Jarvis & Son	565

LONDON.—For alterations at the "Rising Sun" public house, Newburn-street, Vauxhall. Mr. John Hamilton, architect:—

Jarvis & Son	£1,154	Snewin Bros. & Co.	£999
Pritchard & Bennett	1,048	Smith	969
Whitehead	1,025		

LONDON.—For the erection of a shirt factory in Wood-street Woolwich, for Messrs. John James & Co. Mr. John O. Cook, architect:—

Richardson	£4,676	Proctor	£4,400
Kirk & Randall	4,675	Sanford	4,150
Smith & Son	4,643	Thomas & Edge*	4,117

* Accepted.

LONDON.—For rebuilding No. 44, Jewin-street, E.C. Mr. William Burrell, architect:—

Ashby & Horner	£2,945	Lascelles & Co.	£2,759
Wm. Downs	2,930	Patman & Fotheringham	2,751
Hall, Beddall & Co.	2,890	Ashby Bros.	2,682
Woodwood & Co.	2,800	Perry Bros.	2,477

LONDON.—For alterations and additions to 39, Haymarket, for Messrs. Godfrey Phillips & Sons. Mr. P. M. Roberts, architect, 156, Regent-street:—

Drew & Cadman	£888	Speechley & Smith, Richmond*	£798
Wontner Smith	838	Irwin	645
Cohen	821		

* Accepted to complete in six weeks.

LONDON.—For the erection of two cottages at the rear of the "Rising Sun" Hotel, Anerley-road, Upper Norwood, for the Westminster Brewery Company. Mr. H. W. Budd, architect:—

Prestford & Co.	£1,261	Martin & Sons	£743
Askings	985	H. Leney	727

LONDON.—Accepted for alterations and additions to wine cellars at 139, Anerley-road, Anerley, for Mr. W. J. Ellis. Messrs. Elkington & Son, architects:—

H. Leney, Penge £163

LONDON.—For erecting the "Jubilee Arms" public-house, Greenwich, for the Winchester Brewery Company, Limited:—

Ham & Son	£2,115	W. Smith	£1,807
Holloway	2,017	Jones & Rhodes	1,709
Tyreman	1,961	Simpson & Co.	1,769

LONDON.—For building stable and workshops in Belvedere-road and Chickeley-street, Lambeth, for Mr. B. T. Chamberlain. Mr. Robert Willey, architect, 33, New Bridge-street, E.C. Quantities by Mr. A. Howard, The Outer Temple, E.C.:—

Perry & Co.	£3,898	Rowe	£3,775
Patman & Fotheringham	3,841	Smith & Sons	3,743
Thompson & Bevendge	3,795	Bennett	3,716
C. Ansell	3,777	Holliday & Greenwood*	3,645

* Accepted.

LUTON.—For the erection and completion of a theatre at Luton, Bedfordshire, for Mr. Reginald F. Turner. Mr. C. Herbert Shoppee, architect, No. 22, John-street, Bedford-row, London, W.C. Quantities by Messrs. Morris, Evans, & Son:—

G. Smart	£16,363 12	McCormick & Sons	£13,987 0
S. F. Halliday	14,318 0	C. Miskin & Sons	13,470 0
T. & E. Neville	14,309 0	W. G. Dunham, Luton*	13,275 0
F. Gough & Co.	14,244 0	* Accepted.	

Messrs. R. Moreland & Sons, Limited, accepted for constructional iron and steel work.

LUTON.—For the erection of two villas, Cardiff-road, for Mr. J. Flint. Mr. A. Wilkinson, architect:—

Brown	£1,622	Saunders & Son	£1,540
Pryer	1,545	Smart, Luton (accepted)	1,350

MIDDLEZOY (Somerset).—For the erection of Wesleyan church. Messrs. Bowring & Hawkins, surveyors, 11, High-street, Glastonbury:—

Harris & Tapscott, Bridgwater £419 10

MORTLAKE.—For the erection of five cottages in Alder-villas, road, Mortlake, for Sir Frederick Wigan, Bart. Mr. C. Innes, architect, 27, Queen-street, City, E.C.:—

Davis Bros.	£2,855 4 8	A. Sale	£2,325 0 0
Adamson & Son	2,376 0 0	A. Hunt	2,059 6 3
H. Roffey	2,375 0 0	Jas. Hill, Barnes*	1,769 19 0

* Accepted.

NORTHAMPTON.—For erecting new warehouse premises, Abington-street, Northampton, for Mr. A. Phillips. Messrs. Mosley & Anderson, architects, Northampton:—

A. P. Hawtin	£2,689	E. Archer	£1,840
W. Beardsmore	1,940	E. D. Sharman	1,825
R. Cosford	1,900	G. F. Sharman	1,794
Green Bros.	1,889	Wilson & Alright	1,779
W. Heap	1,850	H. Martin (accepted)	1,760

NORTH SHIELDS.—For the supply of whinstone, for the Tynemouth Rural District Council. Mr. J. Waters, C.E., Long Benton, Newcastle-on-Tyne:—

Mark Appelby	£958 14 2
Northumberland Whinstone Co., Ltd, Newcastle-on-Tyne (accepted)	937 5 0

NORWICH.—For the erection of technical institute, for Norwich Corporation. Mr. A. E. Collins, City Architect, Guildhall, Norwich:—

Scarles Bros.	£19,463	T. H. Blyth	£17,900
Shillito & Sons	19,250	Youngs & Sons	17,777
Downing & Sons	19,100	Kerridge & Shaw	17,690
G. E. Hawes	19,020	S. Warburton, Miles Platting, Manchester*	16,939
J. S. Smith	18,187		

* Recommended for acceptance.

NORWICH.—For the conversion of a building in Pottergate-street to the purpose of a fire brigade station. Mr. Arthur E. Collins, City Architect, Norwich:—

North & Sons	£393 10	T. H. Yelf	£309 0
J. S. Smith	349 0	A. Hipperson	250 0
Scarles Bros.	339 0	Tyrrell Bros., Whitefriars Bridge, Norwich*	300 0
Daws	338 0		

* Recommended for acceptance.

OSWESTRY.—For the erection of Primitive Methodist Chapel. Mr. J. D. Mould, architect, Joint Stock Bank-chambers, Kingstreet, Manchester. Quantities by architect:—

Hulse	£1,858 0	Wood	£1,627 0
Jones	1,826 0	J. Higgins, Oswestry, Salop*	1,546 0
Thomas	1,683 10		
Griffiths	1,680 0	* Accepted.	

PENGE.—For alterations and additions to 21, Beckenham-road, Penge, for the London and County Banking Company. Messrs. Elkington & Son, architects:—

C. Homewood	£711 10 6	H. Leney, Penge*	£585 0
Syme & Duncan	600 0 0	* Accepted.	

PENYCOE (North Wales).—For the erection of new Baptist schoolroom. Mr. J. W. Jones, architect, Acrefair, Ruabon:—

J. Carden	£408 0 0	A. Tomkins*	£328 16 6
J. T. Jones	275 0 0	* Accepted.	

PERTH.—For the execution of road works, Ballantine-place, for the Police Commissioners. Mr. R. M. Killop, Burgh Surveyor, 12, Tay-street, Perth:—

D. & R. Taylor	£156 2 1	Peter Girrity, Dundee*	£143 7 1

* Accepted.

PERTH.—Accepted for additions to Southern District school, for the School Board. Mr. G. P. K. Young, architect, 42, Tay-street, Perth:—

Masonry.—William Tait, Errol	£1,733 1 8
Joinery.—Wm. Dow & Son, High-street, Perth	1,770 8 1
Plumbing.—James McLeish, Mill-street, Perth	278 15 0
Plastering.—Alex. McRitchie, Temple-lane, Dundee	332 3 9
Slating.—Jas. Buchan, King-street, Perth	84 5 2
Blinds.—D. Campbell, George-street, Perth	13 0 8

PINNER.—For erecting a new police-station at Pinner, for the Receiver for the Metropolitan Police District. Mr. J. Dixon Butler architect. Quantities by Mr. W. H. Thurgood:—

Higgs & Hill	£4,140	Lathey Bros.	£3,487
Grover & Sons	3,943	C. & J. Waterman	3,384
Lascelles & Co.	3,870	Batchelor	3,290
Willmott & Sons	3,862	Fassnidge & Sons	3,289
T. Parker	3,850	Parsons	—
Lawrance & Sons	3,662	Holloway Bros.	—
Scrivener & Co.	3,603		

ROTHERHAM.—For the execution of sewerage works, Swallownest, &c., for the Rural District Council of Rotherham. Mr. B. Godfrey, C.E., 29B, High-street, Rotherham. Quantities by engineer:—

C. A. Walker	£932 11 3	M. Hall & Sons	£816 7 7
W. H. Trehern	930 6 8	W. Dolman	724 5 0
Robt. Snell	900 0 0	T. Franklin, Sheffield*	723 10 8

* Accepted.

OAK DESKS.—Supply of oak desks on a running contract, for the School Board for London:—

Sizes, &c.	Bennet Furnishing Co.*	T. Cruwys.	G. M. Hammer & Co.	W. H. Lascelles & Co.	S. J. Waring & Sons.
	s. d.	s. d.	s. d.	£ s. d.	£ s. d.
Standard desks, No. 1 size, including delivery, each	16 9	19 0	17 6	1 0 7	2 1 0
" " 2 " " "	16 7	19 0	17 6	1 0 5	2 1 0
" " 3 " " "	16 5	18 6	17 3	1 0 4	2 1 0
" " 4 " " "	16 3	18 6	17 3	1 0 3	2 0 6
" " 5 " " "	16 1	18 0	17 0	1 0 2	1 19 6
" " 6 " " "	15 11	18 0	17 0	1 0 1	1 19 6
K.G. desks " 7 " " "	14 6	12 6	12 6	0 16 2	1 9 6
" " 8 " " "	11 9	11 7	14 6	0 16 0	1 9 6

* Recommended for acceptance.

SUTTON.—For the erection of residences, Sutton, Surrey. Messrs. Gordon, Lowther & Gunton, architects :—

Shaplin	£6,287	J. Smith & Son	£5,750
Castle & Son	5,945	Humphries	5,669
Snewin Bros. & Co.	5,940	Potter	5,645
Gust	5,888		

TOOTING.—For erecting the London and South-Western Bank at Tooting. Mr. G. Frisch, architect :—

	Bank.	Fittings.	Total.
Potterton	£3,964	£266	£4 230
Gregory	3,993	215	4,208
Candler	3,720	260	3 980
Carmichael	3,617	246	3 923
Garrett	3 660	248	3,9 8
Ham & Son	3 574	253	3,827
E. J. Sanders	3,520	199	3,659

WALSALL.—For the erection of school buildings, Whitehall, West Bromwich-road, for the School Board. Messrs. Bailey & McConnal, architects, Bridge-street, Walsall. Quantities by the architects :—

H. Willcock & Co.	£8,952	S. Wootton	£7,746
W. & J. Webb	8,519	J. Dallow	7,695
W. Hopkins	8,500	J. Guest & Sons	7,642
F. L. Jones	8,353	W. Wistance, Walsall*	7,297
Execrs. of J. Lynex	8,332	J. Mallin	7,193
C. A. Horton	8,316	J. H. Whittaker	6,973
R. M. Hughes	7,921		

* Accepted.

WIMBLEDON.—For making-up, &c., Olive-grove and several other streets, for the Urban District Council :—

Somerset-road.

Jno. Mowlem & Co.	£864	E. Iles, Wimbledon*	£582

Olive-grove.

no. Mowlem & Co.	£527	E. Iles, Wimbledon*	£479

Fairlawn-road.

E. Iles	£448	Jno. Mowlem & Co., Westminster*	£431

* Accepted.

LONDON SCHOOL BOARD TENDERS.

At the last meeting of the London School Board, the following lists of tenders were submitted by the Works Department :—

DANIEL-STREET.—New school—boys, 358; girls, 358; infants, 422; total, 1,138. The plans also include a Manual Training Centre, Cookery and Laundry Centres, and Schoolkeeper's house.

		Extra for brickwork in cement.
Leslie & Co. (Limited)	£24,601 0 6	£220
R. A. Yerbury & Sons	23,384 0 0	271
C. Miskin & Sons	23,099 0 0	280
Kilby & Gayford	23,011 0 0	275
Stimpson & Co.	22 892 0 0	285
Clarke & Bracey	22,869 0 0	270
W. Gregar & Son	22,762 0 0	276
J. Grover & Son	22,530 0 0	281
Kirk & Randall	22,547 0 0	275
*E. Lawrance & Sons	22 272 0 0	264

ELEANOR-ROAD.—Adapting an old house for school-keeper:—

E. Lawrance & Sons	£181 0	G. Wales*	£163 18
Grover & Son	168 0		

ENFIELD-ROAD.—Adapting an old house for school-keeper :—

Grover & Son	£675 0	Treasure & Son	£621 0
E. Lawrance & Sons	650 0	Gardner & Hazel.*	274 10
Harrison & Spooner	642 0		

HEAD OFFICES.—Providing and fixing mahogany desk with cupboards, &c. —

F. Sage & Co.	£57 0	Newson & Co.*	£33 15
Lascelles & Co.	46 10		

HEAD OFFICES.—Providing cupboard for plans :—

R. Spencer & Co.	£22 10	Educational Supply Association, Limited*	£18 15
T. Cruwys	22 5		

PECKHAM-ROAD.—New school—boys, 240; girls, 240; infants, 276; total, 756. Manual Training Centre and Divisional Offices :—

		Extra for brickwork in cement.
Leslie & Co, Limited	£26,887 13 2	£422 16 3
Clarke & Bracey	25 706 0 0	525 0 0
E. Lawrance & Sons	25.247 0 0	530 0 0
W. Pattinson & Sons	25 293 0 0	396 0 0
Treasure & Son	24,795 0 0	481 0 0
Holloway Bros	24,818 0 0	384 0 0
G. E. Wallis & Sons	24,432 0 0	384 0 0
W. Downs	24,118 0 0	535 0 0
Edwards & Medway*	22,577 0 0	380 0 0

SMITH-STREET.—Erecting school — boys, 232; girls, 232; infants, 337; total, 801; and special school for 60 children; Cookery Centre, Manual Training Centre, with playground on roof of school for boys:—

		Extra for brickwork in cement.
J. Grover & Son	£17,451	£290
F. & F. J. Wood	17,349	280
W. Gregar & Son	17,287	310
Treasure & Son	17,287	312
J. Carmichael	17,195	332
L. H. & R. Roberts	17,147	335
E. Lawrance & Sons*	16,619	299

VICTORIA (JM).—Painting interior and exterior :—

G H. Sealey	£259 10	F. G. Minter	£95 0
H. Flood	172 0	W. Brown*	90 10
C. Gurling	145 0	W. R. & A. Hide	65 5
Bristow & Eatwell	144 15		

WORNINGTON-ROAD.—Re-arranging, re-fitting, and extending boys' offices, altering urinal, and connecting to the existing drainage :—

W. Hammond	£529	Marchant & Hirst	£323
Lathey Bros.	519	R. A. Yerbury & Sons*	319
Humpherson & Co.	475		

* Accepted.

London School Board Tenders. — Among the School Board tenders published in our last issue the amount of Mr. F. G. Minter's tender for painting interior "Battersea Park-road," was stated to be £395. It should have been £395.

TO CORRESPONDENTS.

F. H. S. (Amounts should have been stated).

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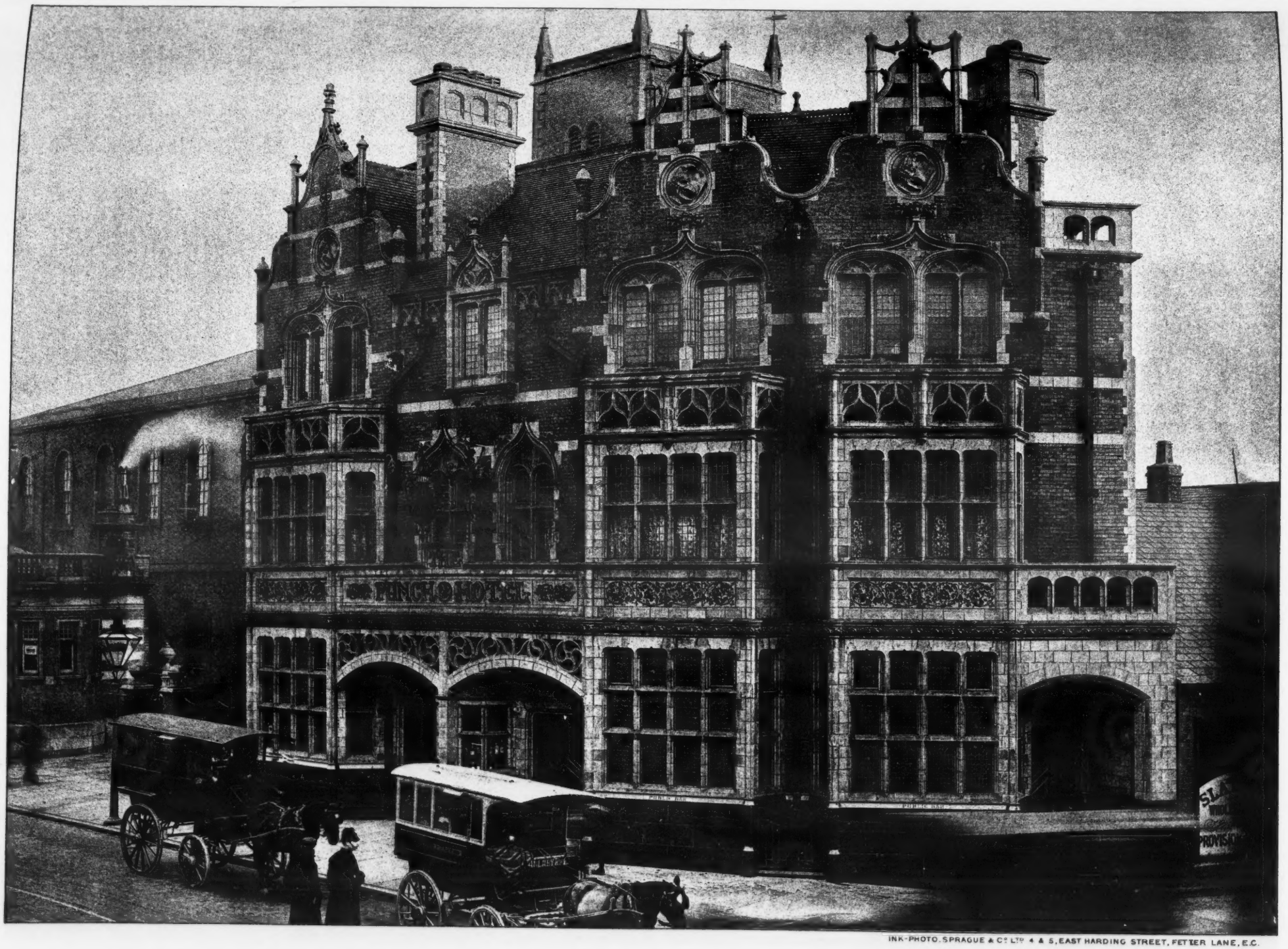

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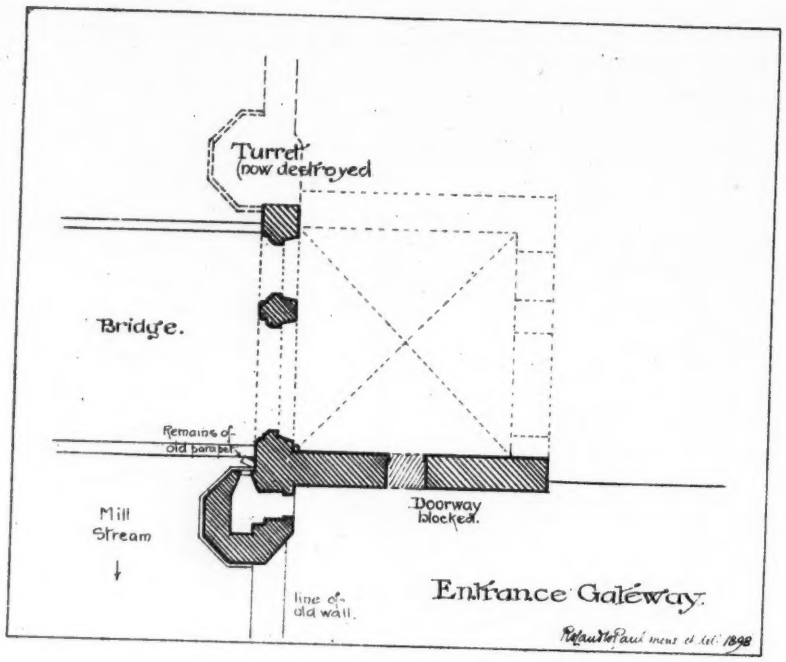
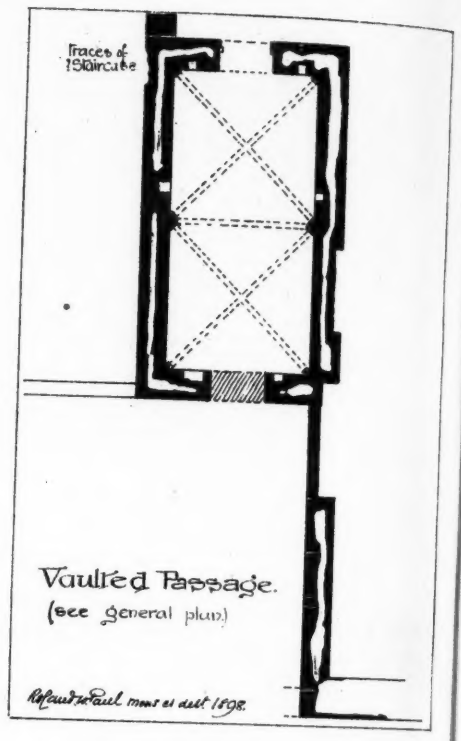
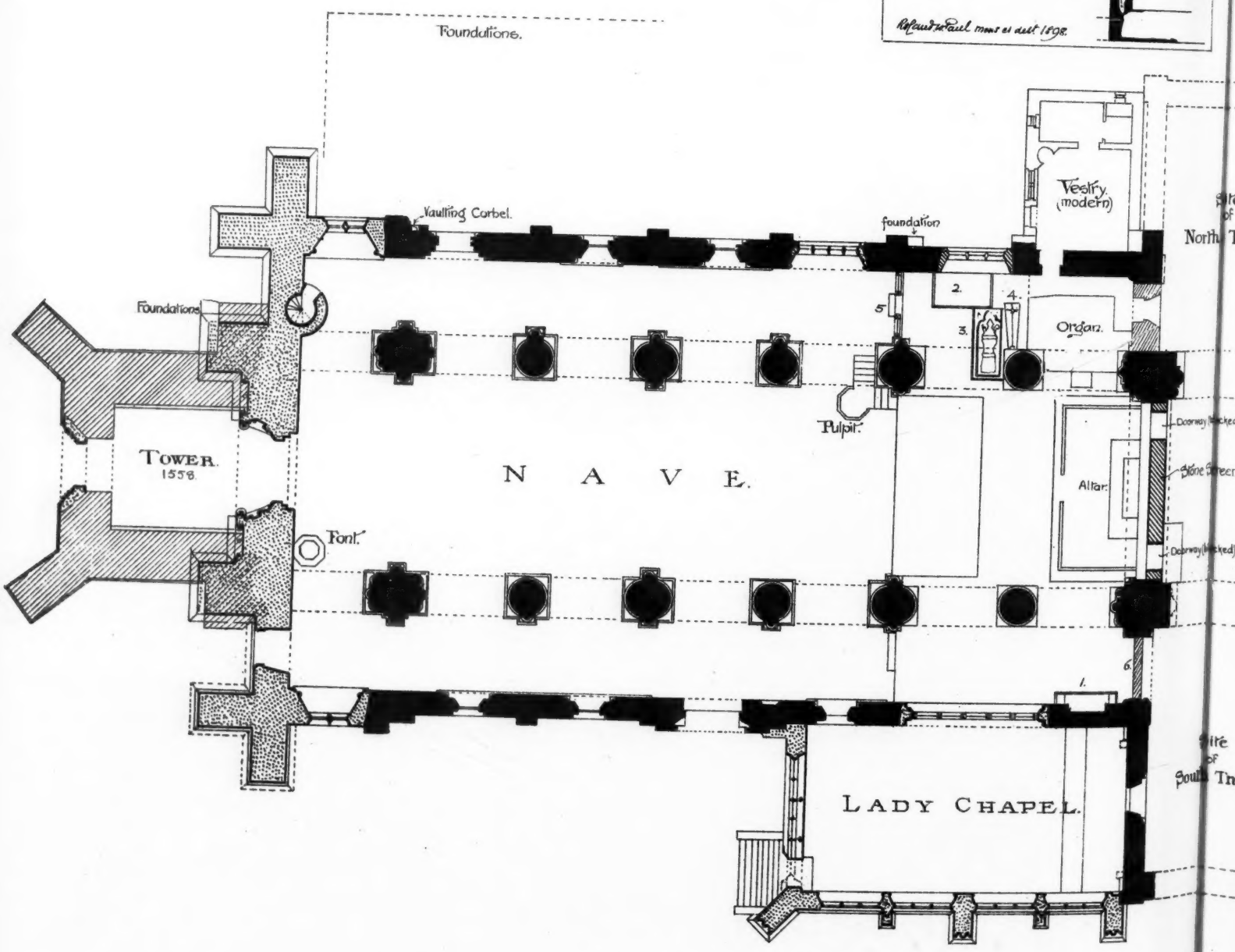
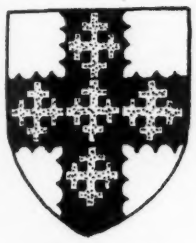

Turret
(now destroyed
Bridge.
Remains of old parapet
Doorway blocked.
Mill Stream
line of old wall.
Entrance Gateway.
Rdsmith Paul mens et delt 1898


Traces of Staircase
Vaulted Passage.
(see general plan)
Rdsmith Paul mens et delt 1898.


Foundations.
Vaulting Corbel.
foundation
Vestry (modern)
Site of North Transept
Foundations
Organ.
Pulpit.
Doorway (blocked)
Stone Screen.
Altar.
Doorway (blocked)
TOWER.
1558.
NAVE.
Font.
LADY CHAPEL.
Site of South Transept



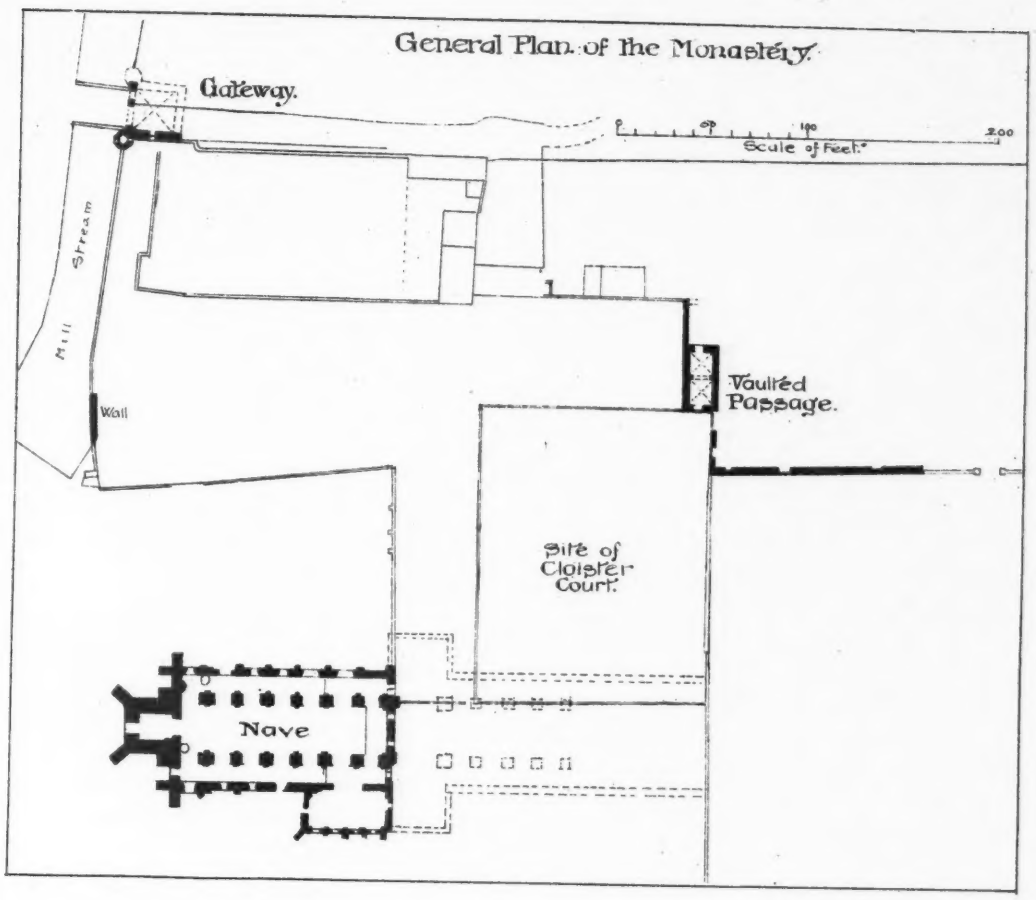
Arms of the Abbey.

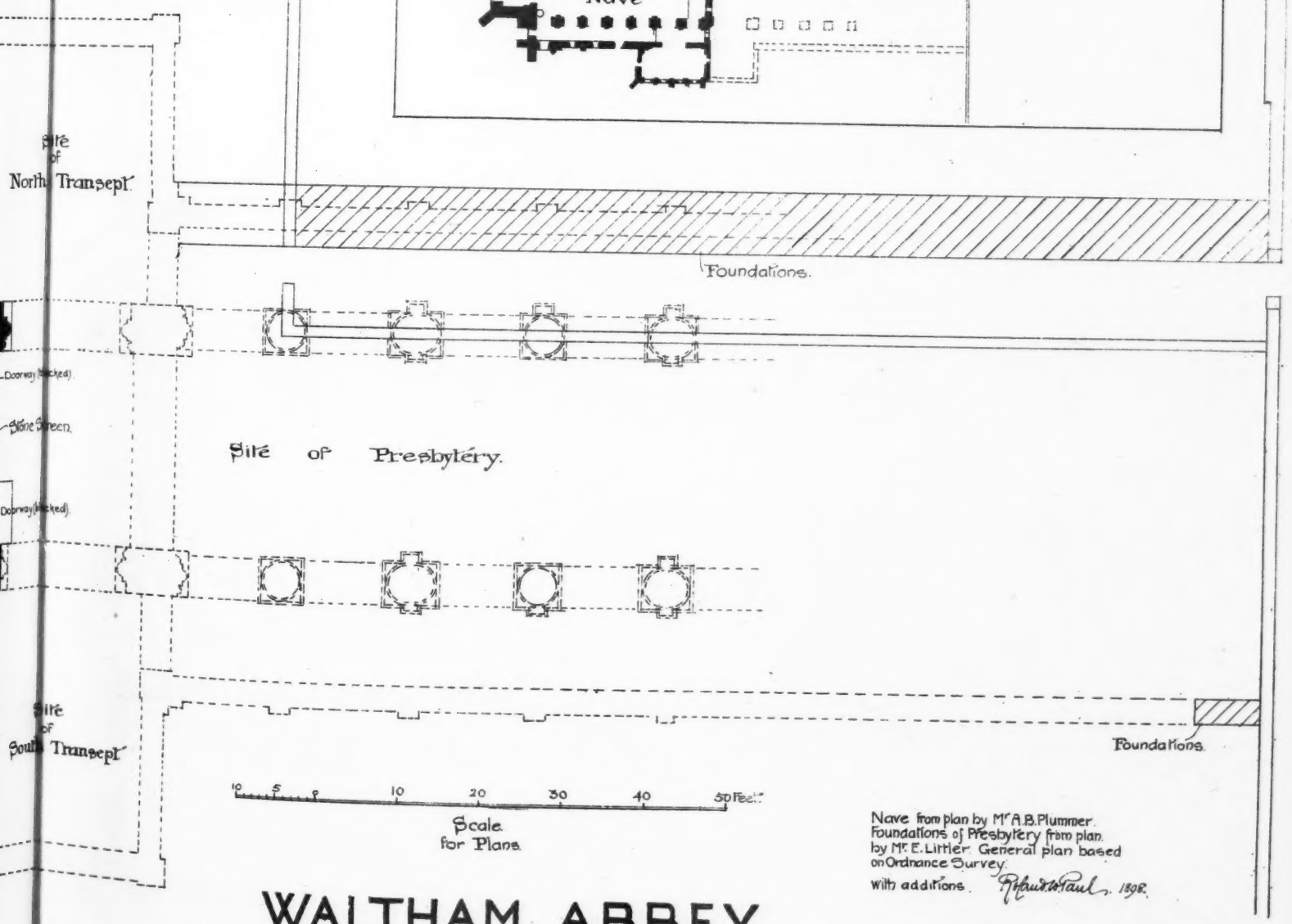
Monuments, etc.

1. Denny Monument 1599.
2. Smith Monument 1697.
3. Matrix of brass
4. Slab with Cross.
5. "Decorated" Screen.
6. Remains of Reredos (built in).

Dates.

- Norman.
- Transitional.
- Decorated.
- Perpendicular.
- Later.
- Modern.





Nave from plan by Mr A.B. Plummer.
Foundations of Presbytery from plan by Mr E. Littler. General plan based on Ordnance Survey with additions. Richard Paul, 1898.

WALTHAM ABBEY

Ground Plan.

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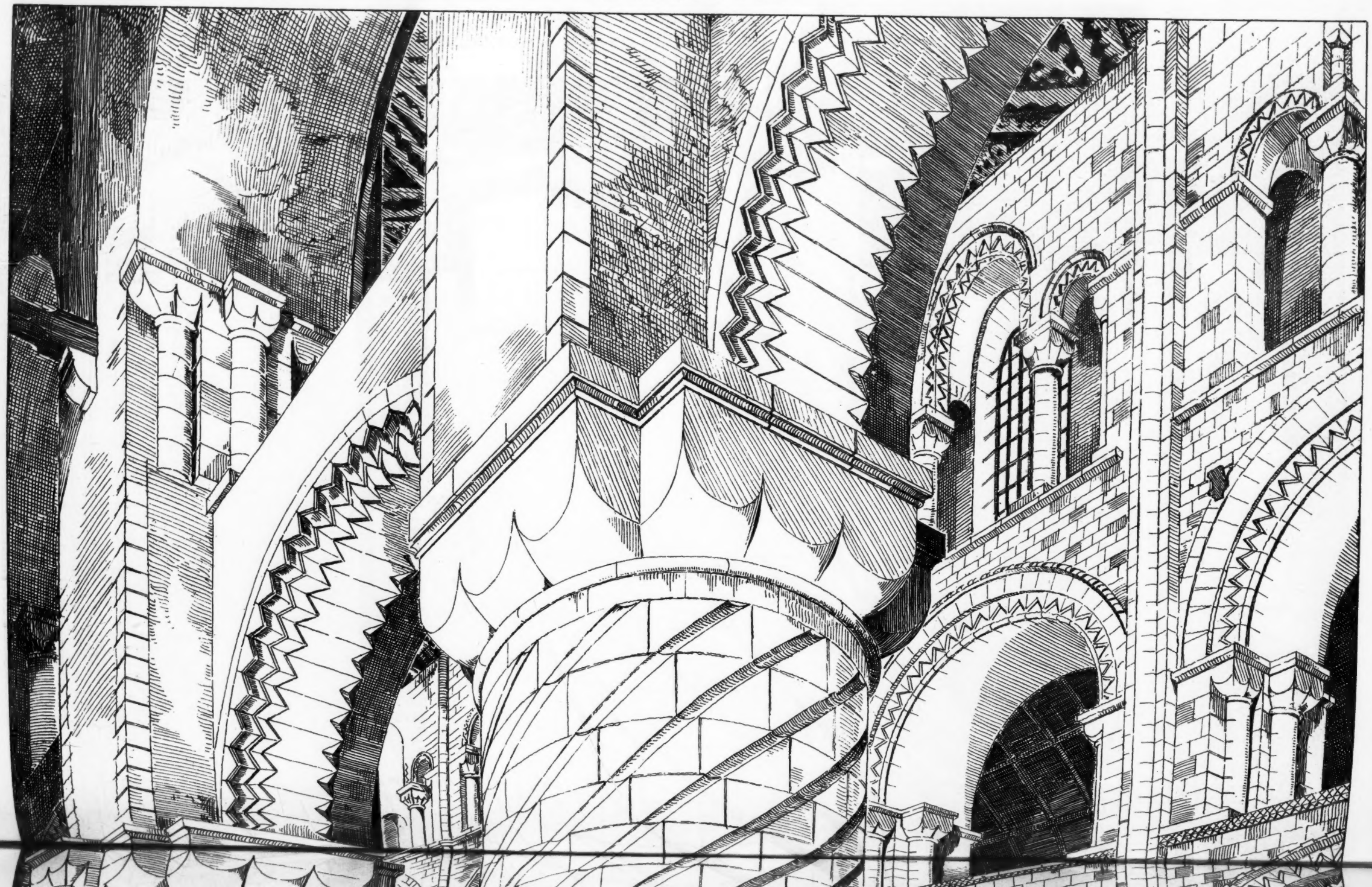

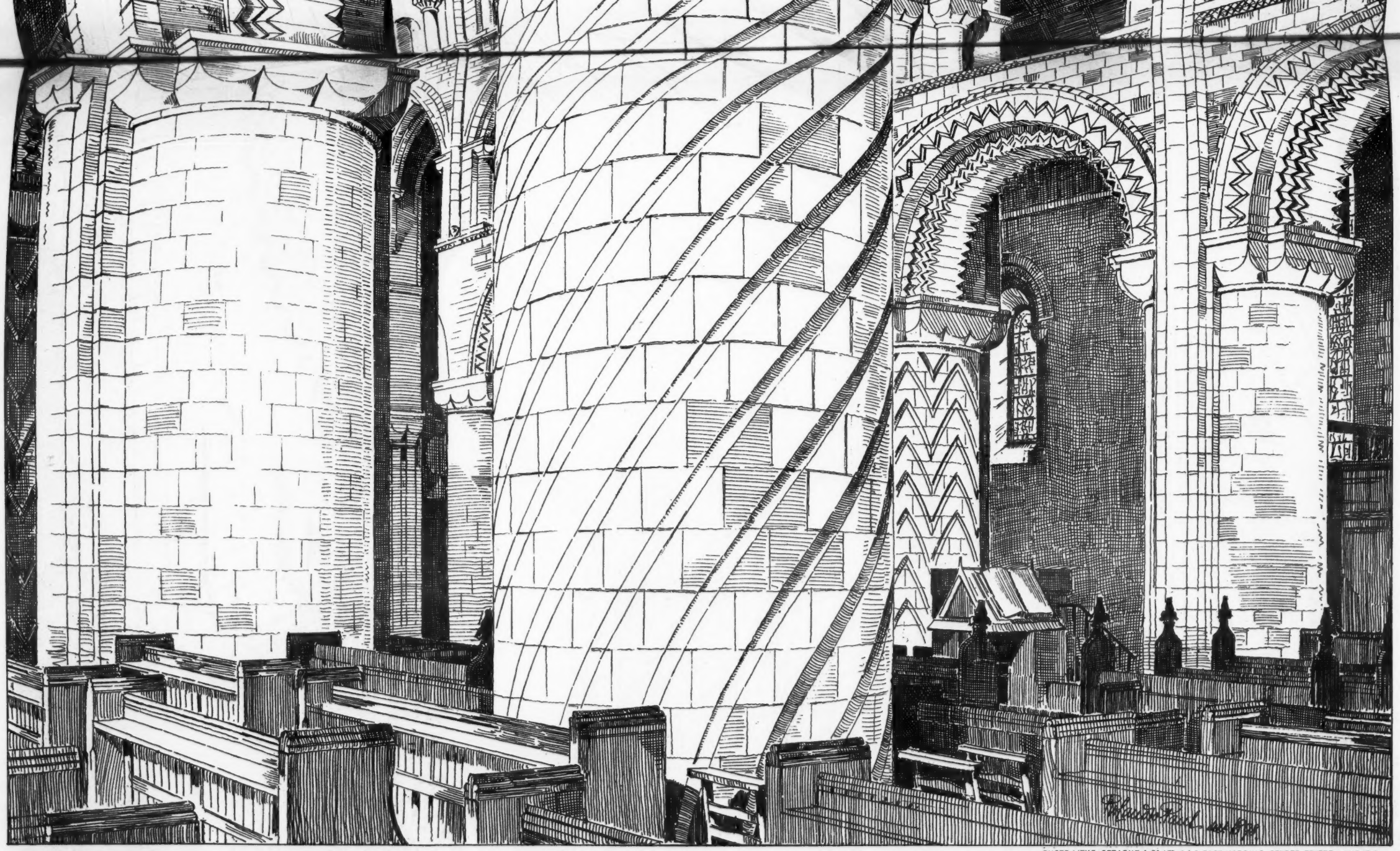

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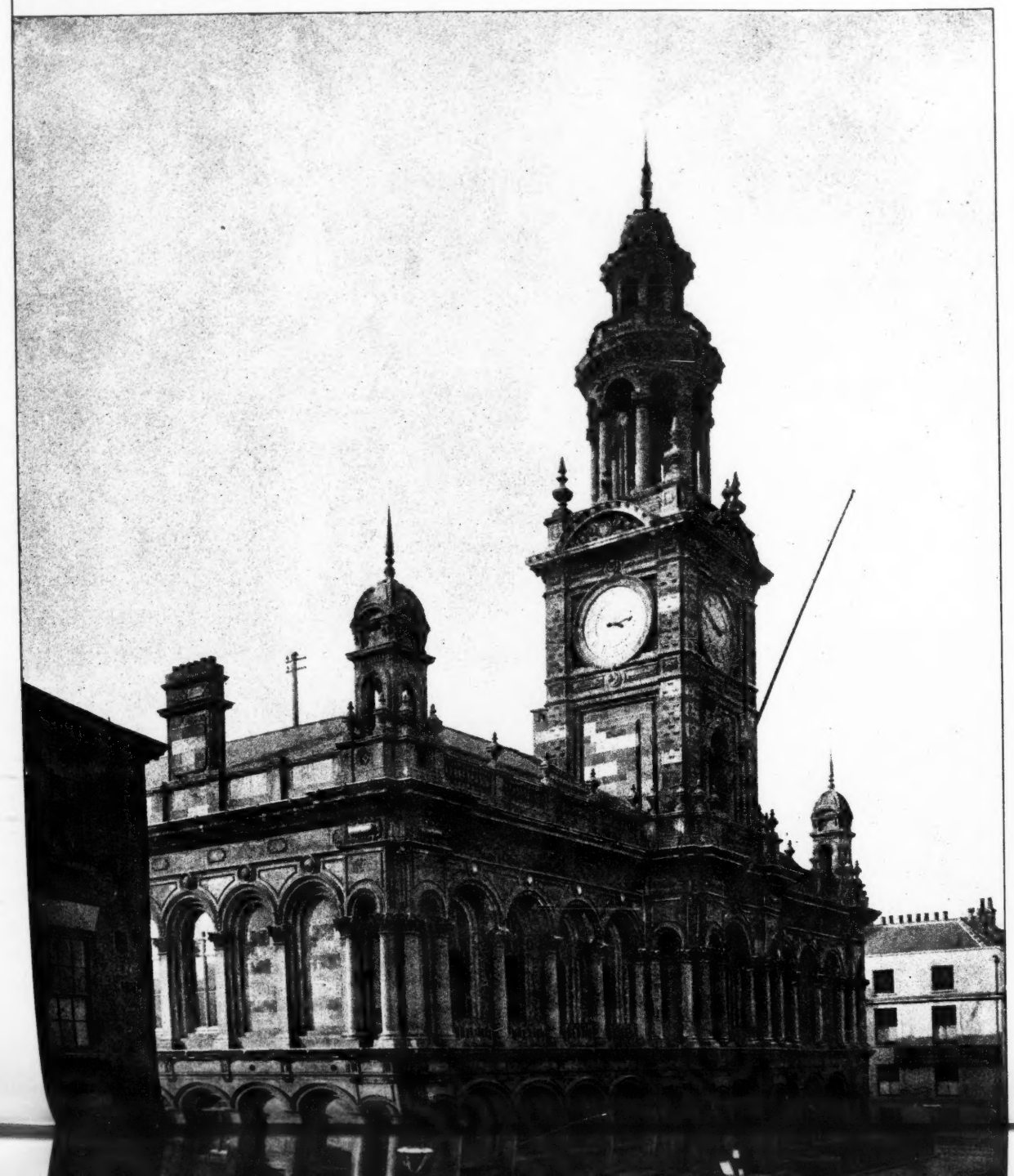

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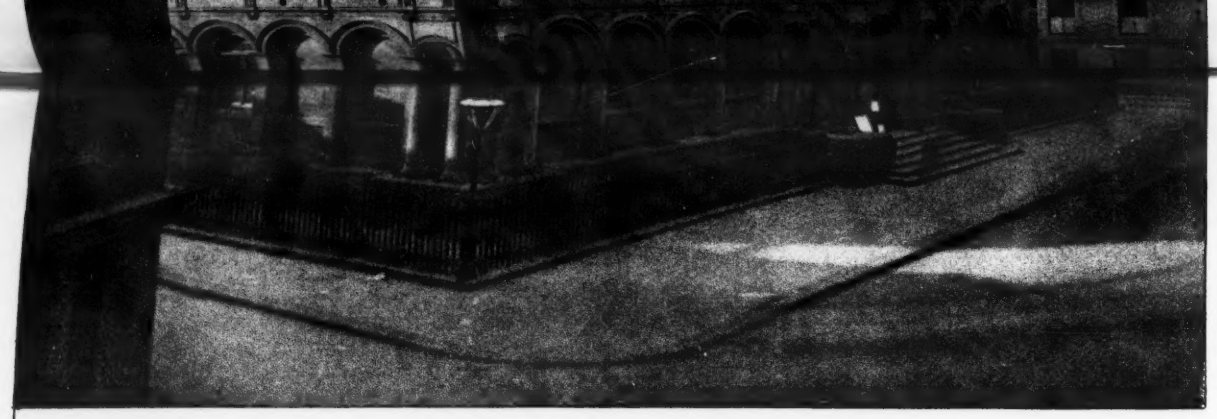

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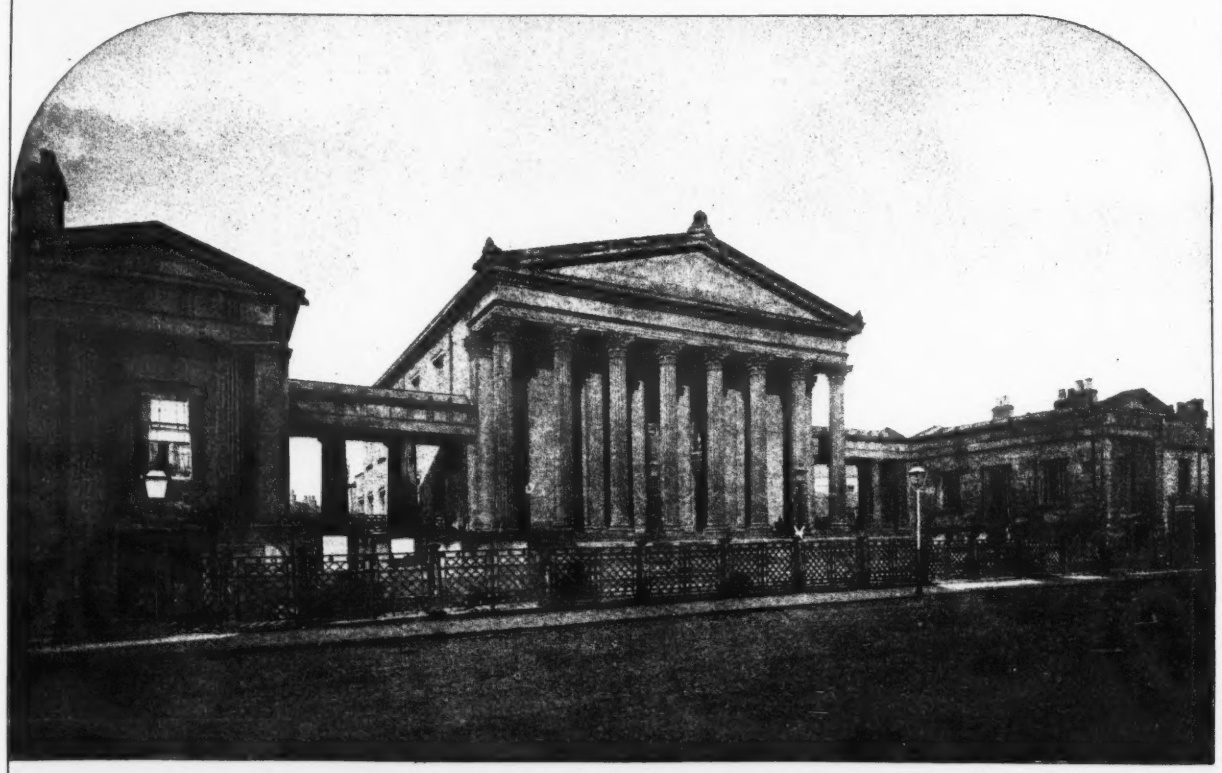

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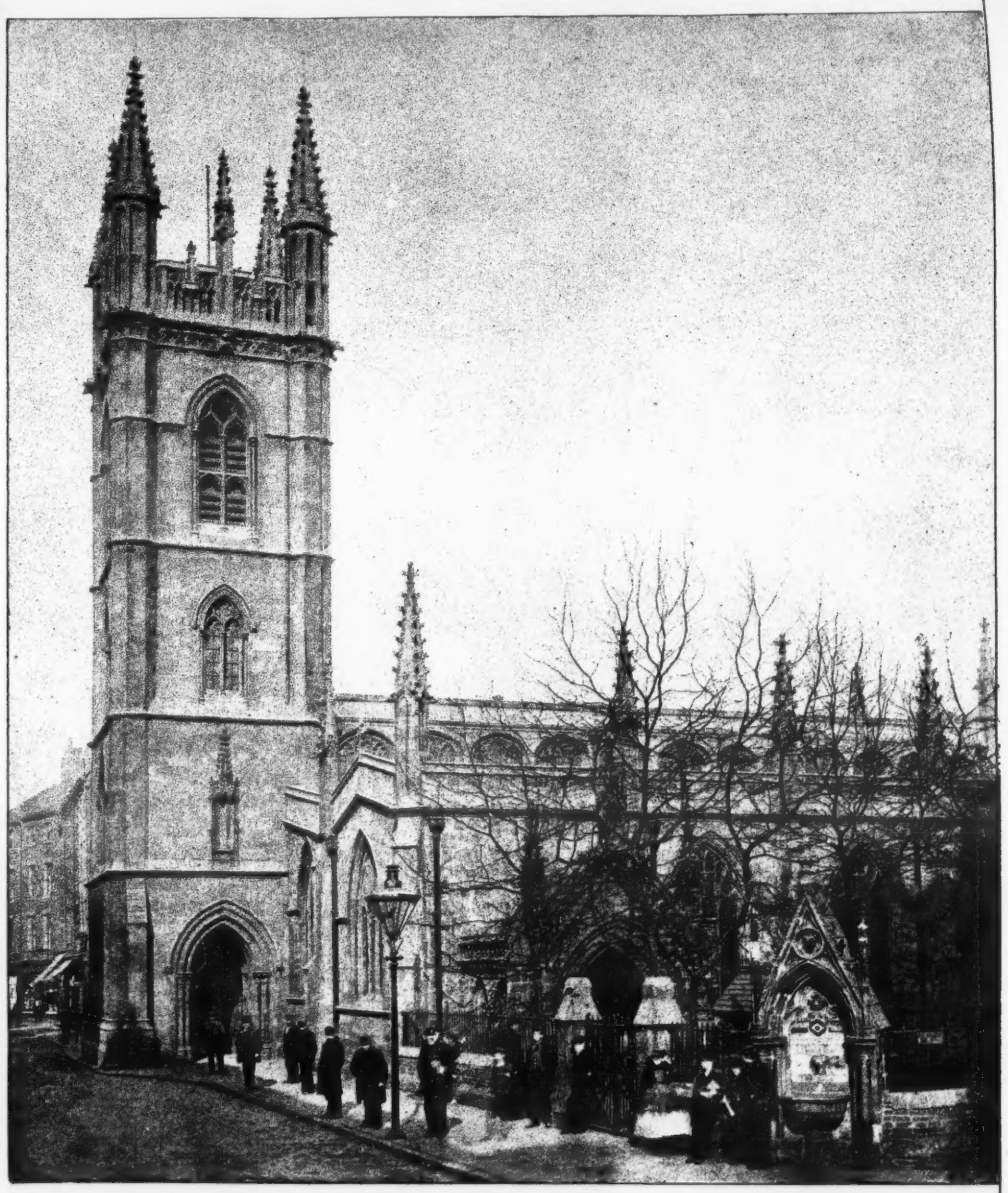

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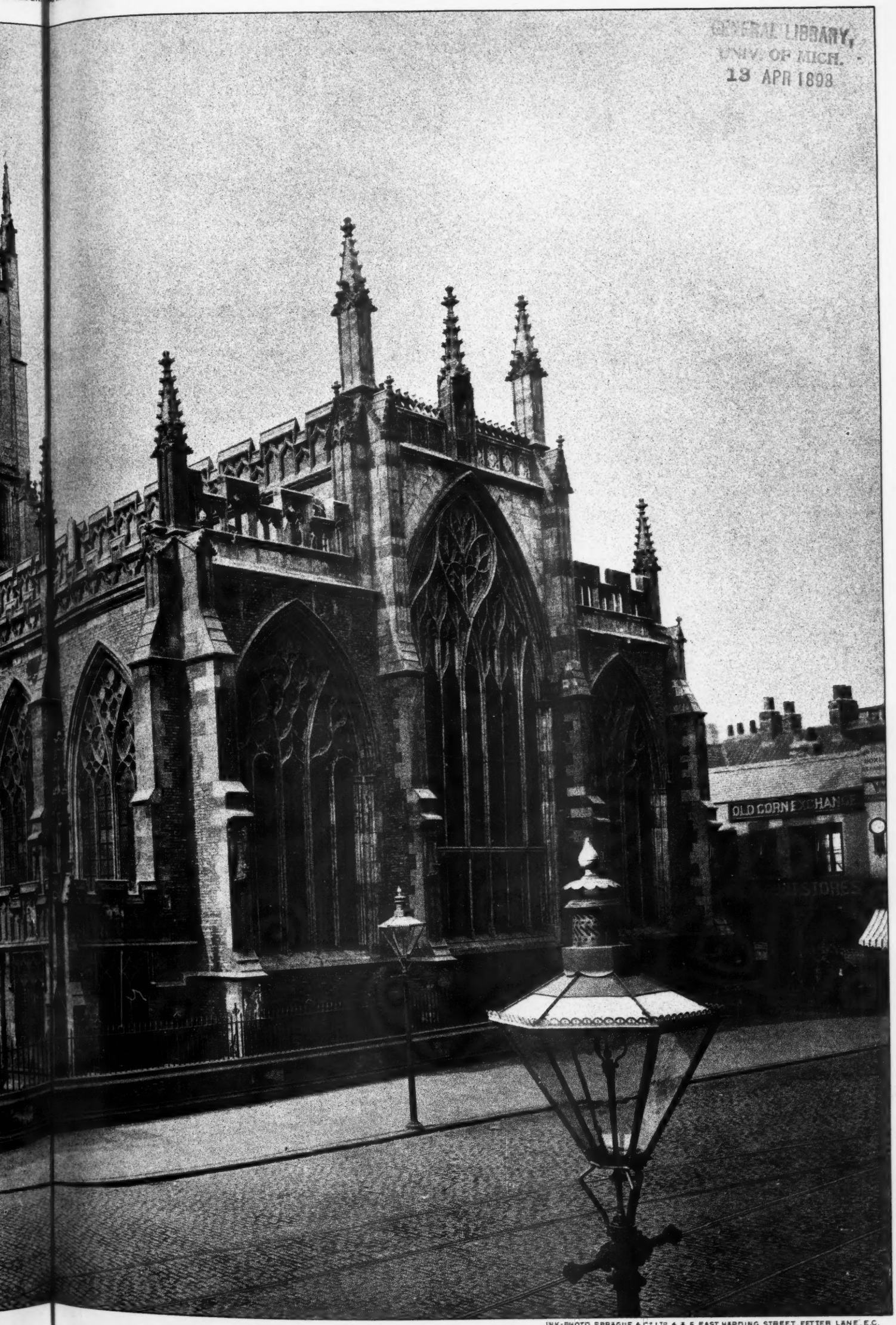

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